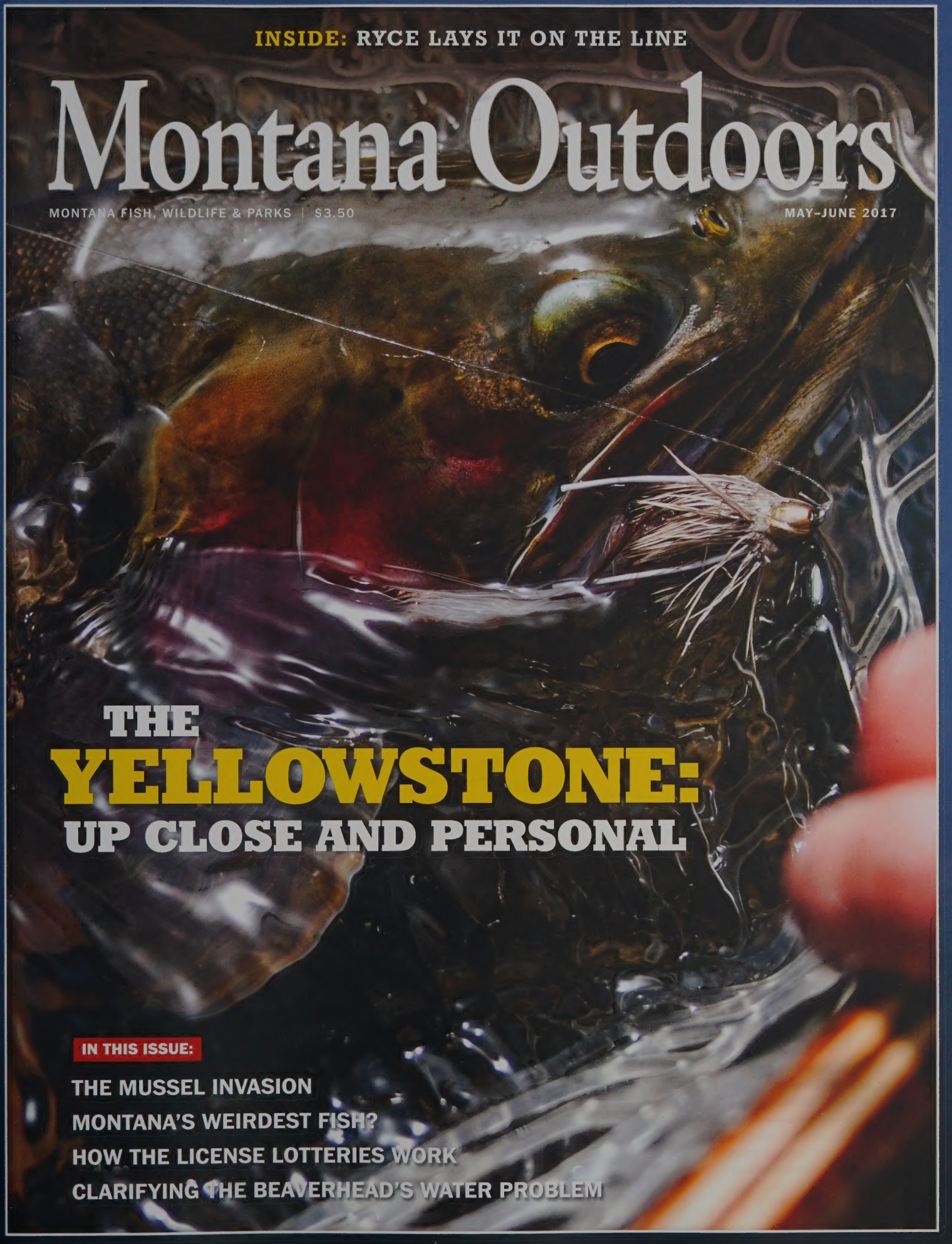
INSIDE: RYCE LAYS IT ON THE LINE

Montana Outdoors

MONTANA FISH, WILDLIFE & PARKS | $3.50

MAY–JUNE 2017



THE YELLOWSTONE: UP CLOSE AND PERSONAL

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THE MUSSEL INVASION

MONTANA'S WEIRDEST FISH?

HOW THE LICENSE LOTTERIES WORK

CLARIFYING THE BEAVERHEAD'S WATER PROBLEM

Montana Fish, Wildlife & Parks

FIRST PLACE MAGAZINE: 2005, 2006, 2008, 2011
SECOND PLACE MAGAZINE: 2007, 2009, 2012, 2015, 2016
Awarded by the Association for Conservation Information

FIRST PLACE MAGAZINE: 2012
Awarded by the National Association of Government Communicators

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***MONTANA OUTDOORS* MAGAZINE**
VOLUME 48, NUMBER 3
For address changes or other subscription information call
800-678-6668

Montana Outdoors (ISSN 0027-0016) is published bimonthly by Montana Fish, Wildlife & Parks. Subscription rates are $12 for one year, $20 for two years, and $27 for three years. (Please add $3 per year for Canadian subscriptions. All other foreign subscriptions, airmail only, are $48 for one year.) Individual copies and back issues cost $4.50 each (includes postage). Although *Montana Outdoors* is copyrighted, permission to reprint articles is available by writing our office or phoning us at (406) 495-3257. All correspondence should be addressed to: *Montana Outdoors*, Montana Fish, Wildlife & Parks, 930 West Custer Avenue, P.O. Box 200701, Helena, MT 59620-0701. Website: **fwp.mt.gov/mtoutdoors**. Email: **montanaoutdoors@mt.gov**.

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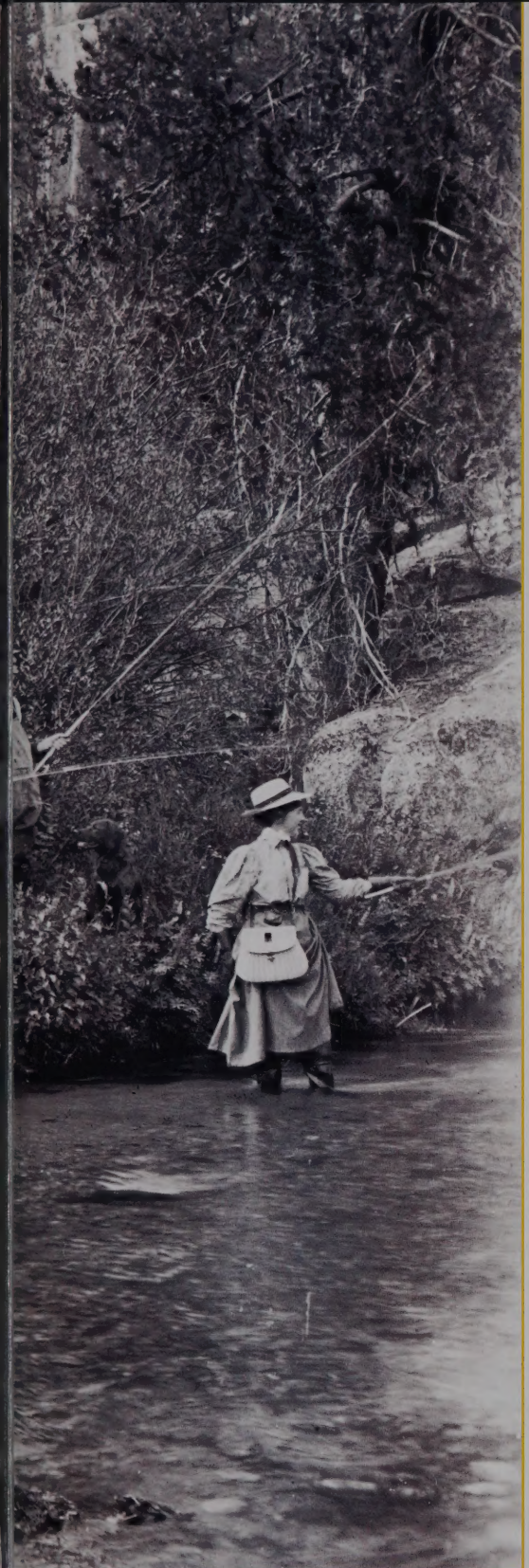
Postmaster: Send address changes to *Montana Outdoors*, Montana Fish, Wildlife & Parks, P.O. Box 200701, Helena, MT 59620-0701. Preferred periodicals postage paid at Helena, MT 59601, and additional mailing offices.

FSC Mix Paper FSC® C007548



MYRTA WRIGHT STEVENS, MAHONEY FISHING COLLECTION, MONTANA HISTORICAL SOCIETY RESEARCH CENTER PHOTOGRAPH ARCHIVES.

NO SHARING WITH BEARS
Anglers fish for trout near Lolo Hot Springs in the 1890s while guards keep an eye out for grizzlies. To learn how FWP has managed the state's fisheries for more than a century, and what that says about Montanans' values, see page 12.

FRONT COVER
A Yellowstone cutthroat taken on the Yellowstone River. See our profile on page 28. Photo by Joshua Bergan.

Montana Outdoors

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Time to broaden the base

Thank you for Hal Herring's essay on federal Pittman-Robertson and Dingell-Johnson excise taxes and their relationship with our treasured outdoor activities ("My Favorite Tax," March-April). Too many people fail to realize how much money sportsmen and sportswomen contribute to conservation programs each year. It is time for other outdoor enthusiasts to contribute. Mountain bikers, four-wheelers, kayakers, and hikers need to kick in toward programs that help ensure their access and enjoyment of the outdoors.

Mike Clark
Billings

Loving tacos and Auchly

The recipe is always the first thing I go to when *Montana Outdoors* arrives. Yesterday I made the Mont-Mex Tacos ("Eating the Outdoors," March-April) using some cod from the market. My wife and I have to say that it is another great recipe. Thanks very much for sharing it. We also loved Bruce Auchly's essay on the traveling moose.

Harry Johnson
Redwood Falls, MN

What about nonresidents?

In the March-April issue article "What about the Others?" concerning the challenge of funding nongame fish and wildlife management, I noticed that there was no mention concerning the financial contributions from nonresidents. From discussions I've had with agency officials in Helena, nonresidents account for roughly 75 percent of FWP's revenue.

Carl Davis
Manson, WA

Editor replies: You are correct that nonresident hunting and fishing licenses account for most of the FWP revenue used for fish and wildlife management. Because the article focused on what Montana residents could do to fund nongame species conservation, it didn't mention nonresidents. However, visitors to Montana definitely could be key to the state's nongame-funding dilemma.

Would nonresident hikers, mountain bikers, campers, sightseers, and others who don't hunt and fish but still enjoy Montana's trails, wildlife, and rivers be willing to help pay for nongame wildlife conservation in this state? For their annual donation, what if they received a car decal or some other way of recognizing their contribution?

Readers, if you have suggestions for ways to fund nongame conservation in Montana, let us know (see contact information below right).

MY FAVORITE TAX

For decades, we hunters, shooters, and archers have been paying a federal surcharge that helps conserve elk, bighorn sheep, geese, grouse, and other wildlife. If you didn't know that, you're not alone. BY HAL HERRING

More inspections!

As a Montana native living in Washington, I applaud your watercraft inspection program as noted in the March-April Outdoors Report ("Montana responds quickly to invasive mussel discovery on several lakes and rivers"). As we make several trips back home each year, we are glad to see your work limiting the spread of this invasive species. This is essential and has to be done now.

> "We are glad to see your work limiting the spread of this invasive species. This is essential and has to be done now."

Jay Scooter
Electric City, WA

Harsh punishment

Whoever brought invasive mussels into Montana should be hung, shot, drawn, and quartered. Any further boats that come into our state carrying mussels should be confiscated and destroyed, and their owners should lose boating privileges in Montana for life.

By the way, the 2017 photo issue was your best ever.

Ed Rittershausen
Polson

Was disease the reason?

I was disappointed to see that you perpetuated a myth concerning the demise of the great bison herds ("Breathing Room," March-April). There is significant research showing that the actual cause of the disappearance of the bison was the introduction of a disease through domestic cattle. This disease was disseminated rapidly by the practice of the cattle drives that brought the livestock from south Texas all the way to Montana that began in the mid-1850s. I am not saying that market hunting did not have an impact, but I would expect a publication like *Montana Outdoors* to include a balanced representation of the causal agents.

David J. Broberg
Cut Bank

Editor replies: Though disease may have contributed to the bison's near-extinction, most credible sources maintain that overhunting was the primary cause.

Corrections

On page 24 in the timeline of the article "What about the Others?" (March-April), we neglected to mention that the federal State Wildlife Grants Program funding helps pay for regional nongame programs, and that the people running those programs are biologists.

The graphic on page 21 of the same article indicated that 29 percent of Montanans hunt, fish, or both each year. That figure is based on what turns out to be a small and statistically insignificant sample size in a 2011 U.S. Fish & Wildlife Service survey. More accurate figures, based on FWP analysis of hunting and fishing licenses: 34 percent of Montanans hunt, fish, or both each year; 56 percent hunt, fish, or both within a five-year period.

Speak your mind

We welcome all your comments, questions, and letters to the editor. We edit letters to meet our needs for accuracy, style, and length. Write to us at Montana Outdoors, *P.O. Box 200701, Helena, MT 59620-0701. Or e-mail us at: tdickson@mt.gov.*

Sesame-Crusted Pan-Fried Trout

By Tom Dickson | Preparation time: 15 minutes | Cooking time: 20 minutes | Serves 4

JOHNNY MILLER

Most trout anglers don't keep fish anymore. That's been good for trout conservation because a released fish can be caught again. But it's a shame so many anglers—and their families—miss out on the joys of eating freshly caught trout, once a cherished Montana tradition.

Where legal, there's nothing wrong with occasionally keeping some trout for a meal. FWP biologists account for harvest in regulations designed to keep populations healthy. In fact, regulated harvest could actually benefit some populations by giving remaining fish more food and habitat to grow larger.

A delicious way to turn a few trout into a scrumptious meal is this simple recipe. It's a slight variation on one published in *Field & Stream* from a Maine chef, who created it for brook trout. The yummy sauce derives from a unique mix of ingredients, most of them found in the Asian aisle of Montana's larger supermarkets. Readers may balk at buying sesame oil, hoisin sauce, and sherry* for a single meal. I urge you to make the investment. Believe me, you'll make this dish more than once.

Fillets of perch, walleye, freshwater drum, and larger trout work well, too. Keep the skin on if you can, but it's no big deal if you don't. Store-bought cod, tilapia, or pollack also make good substitutes.

—Tom Dickson is editor of Montana Outdoors.

For an archive of Eating the Outdoors recipes, visit the Montana Outdoors *website at fwp.mt.gov/mtoutdoors, and click on "Recipes."*

*Many fish and game recipes call for a splash or two of dry sherry, and for good reason. This "fortified" wine—meaning that brandy is added after fermentation to boost the alcohol level and thus longevity—adds flavor and depth to many dishes. Sherry is inexpensive, starting as low as $6 per bottle. Avoid "cooking sherry" found in grocery stores, which has salt added as a preservative and makes a poor substitute.

INGREDIENTS

- 4 whole 11- to 13-inch trout, gutted
- 1 T. plus ½ c. vegetable oil, divided
- 1 T. minced fresh ginger
- 1 T. sliced garlic
- ½ c. chicken stock
- 2 t. dry sherry
- 2 t. soy sauce
- 1 T. sesame oil
- ¾ c. all-purpose flour
- 5 T. toasted sesame seeds
- 1 t. table salt
- 1 T. butter
- 1 T. Chinese hoisin sauce
- ¼ c. chopped scallions (green onions)
- 1 small tomato, chopped
- Julienned scallions, for garnish

DIRECTIONS

Preheat oven to 450 degrees. Heat 1 T. oil in a large saucepan over medium heat. Sauté the ginger and garlic for 1 minute, or until just golden. Add the chicken stock, sherry, soy sauce, and sesame oil. Cook until the liquid is reduced by half, about 5 minutes, and set aside.

Combine the flour, 3 T. sesame seeds, and salt in a bowl. In this mixture, dredge the trout, which should be wet so the mixture adheres. Heat the remaining ½ c. oil in a large sauce or frying pan over medium-high heat. Fry the trout until golden brown, about 3 minutes on each side. Cook in batches.

Place the trout on a cookie sheet lined with parchment paper and roast in the oven for 6 minutes, or until just cooked through.

Meanwhile, bring the chicken-stock mixture to a simmer and whisk in the butter, hoisin sauce, chopped scallions, and tomato. Cook until heated through, about 2 minutes.

Place a trout on each plate and spoon the sauce over each fish. Sprinkle with the remaining 2 T. sesame seeds. Garnish with scallions. ■

All hands on deck

Detection of a few microscopic animals has substantially altered natural resources management in Montana. Monitoring crews with FWP's Aquatic Invasive Species (AIS) Program discovered the minuscule larvae of invasive mussels last fall at Tiber Reservoir, about 60 miles north of Great Falls, and made "suspect" detections at Canyon Ferry Reservoir near Helena. The discovery had been dreaded for years.

Zebra mussels and their close relative, quagga mussels, have slowly been moving west after their discovery in the Great Lakes in 1988. Yet the appearance of either or both here—we don't know for sure which species of larvae was detected—alarmed those of us who help manage Montana's aquatic resources. This marks the first time the invasive mussels have shown up in Montana waters and is the closest they have come to reaching the Columbia River Basin.

Lacking natural predators, invasive mussels reproduce rapidly, by the millions and billions, quickly covering hard underwater surfaces. They clog irrigation, water supply, and hydropower intake pipes, creating costly problems for cities, farmers, ranchers, and power plants. They give boaters headaches by jamming motors and covering hulls. In their adult stage, the thumbnail-size mussels harm lake and river environments and fisheries by consuming vast amounts of tiny food particles needed by fish larvae and aquatic insects.

In states where invasive mussels are rampant, the species cost the public and private sectors tens of millions of dollars in damage each year.

Soon after detection of the mussel larvae last fall, Governor Steve Bullock declared a statewide natural resources emergency and formed an interagency mussel response team composed of FWP, the Montana Department of Natural Resources and Conservation (DNRC), and other agencies. By mid-January, the team had dispatched task forces to set up inspection and decontamination stations statewide, hire seasonal workers to operate the stations, and increase public outreach and education.

The first station, at Canyon Ferry, began operation in March. Statewide, more than 30 stations, twice as many as last year, will operate this spring and summer.

Meanwhile, FWP, DNRC, and other state and federal agencies remain in close contact with each other and with local communities, law-enforcement officials, and Montana legislators. The state has developed response plans for new infestations and will increase lake and river sampling this summer.

Public support for all of these measures has been overwhelmingly positive.

Invasive mussels spread mainly by hitching rides on boats and gear moved from one state to another. That's why FWP's AIS Program has operated mandatory watercraft inspection stations at key sites across the state since 2004. We have also widely promoted the need for boaters and anglers to "Clean, Drain, Dry" their boats and equipment with every use. Mussel-awareness billboards, posters, and PSAs on TV and radio have become commonplace. And they've worked.

For more than a decade, FWP helped keep invasive mussels from reaching Montana waters, despite tens of thousands of boats entering each year from states with established mussel populations. Fortunately, detection crews were in place to catch the invasive mussels' arrival. Early detection gives Montana a much better chance of containing the spread, and buys time while new eradication science and technology are developed.

Now that invasive mussels are in Montana, the response team and its stakeholder partners will do all they can to manage the risk of the species spreading to other Montana waters—and to waters in the Columbia River Basin. FWP will adopt the response team's recommendations, such as doubling watercraft inspection and decontamination stations, building partnerships with local communities, working with stakeholders to build public trust and confidence, and soliciting federal funds to help with costs.

FWP is responsible for boat inspection and decontamination. You have my word that we will do everything in our power on that front. But we can't check every boat, and we won't close every lake and river to boating and angling. Boaters and anglers themselves must think and act differently. That will require patience while waiting in line at inspection stations, and getting into the do-it-yourself habit of cleaning, draining, and drying boats and equipment after every outing.

Statewide, boaters will need to stop at inspection stations and begin to "Clean, Drain, Dry" their watercraft after every outing.

Changing the attitudes and behavior of hundreds of thousands of anglers and boaters won't be easy. It will require the resources and influence of everyone concerned about the threat of invasive mussels—including tribes, communities, outfitters, hydropower and agriculture interests, fish conservation groups, businesses, and state and federal agencies.

Montana is in full-response mode against an invasive species that threatens our recreation, economy, and aquatic ecosystems. It's all hands on deck.

—**Martha Williams**, Director, Montana Fish, Wildlife & Parks

LUKE DUBAN/MONTANA OUTDOORS

THOM BRIDGE

THE ENVISIONER

BARDELL MANGUM
Landscape Architect, Helena

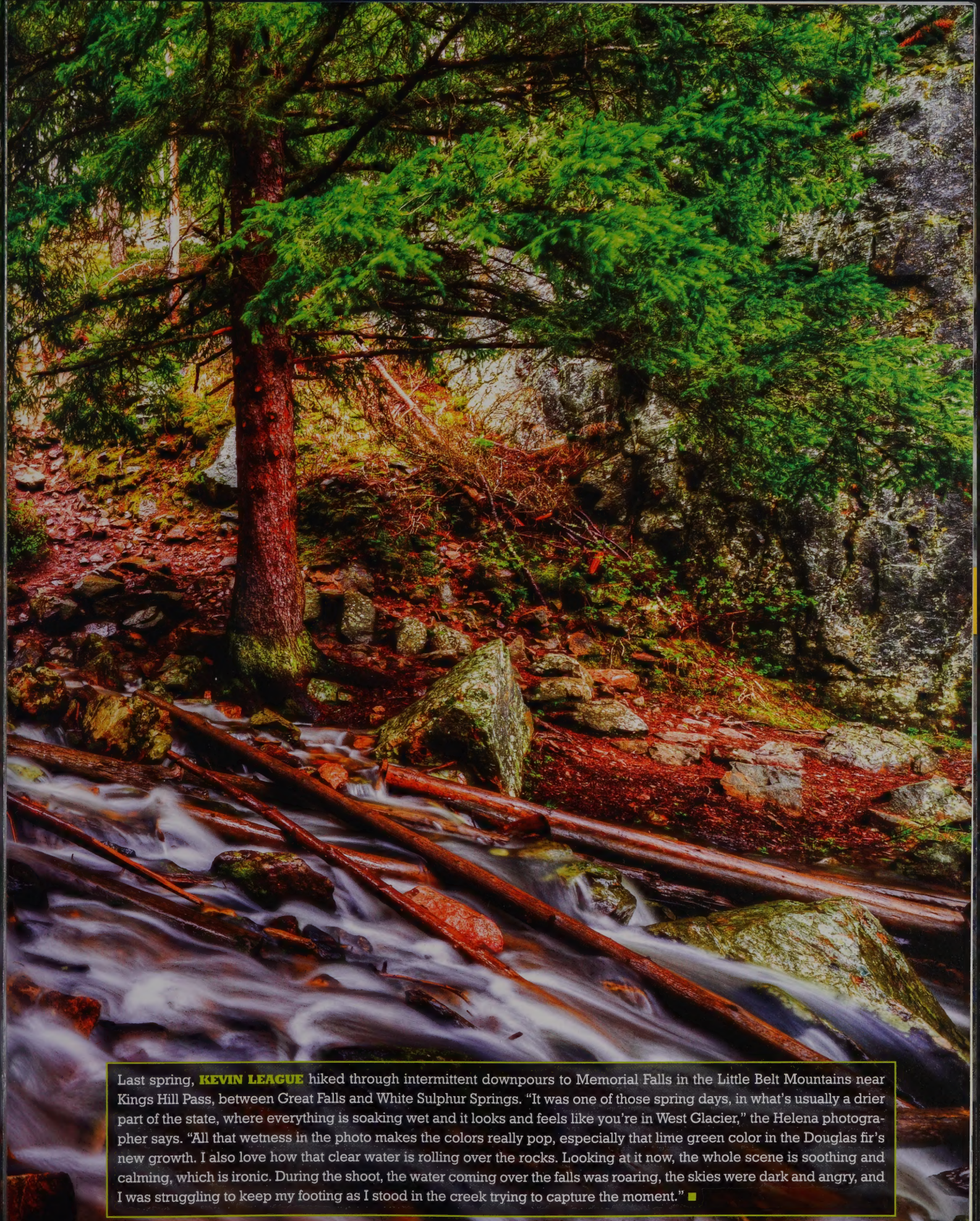
Here in FWP's Design and Construction Bureau, we work on state parks, regional offices, wildlife management areas, fish hatcheries, and fishing access sites.

Improving or developing a recreation site takes a team, and my job is to do the conceptual layout. That means figuring out where sidewalks, roads, boat ramps, latrines, and picnic and camping areas should go. During that process, I consider the health, safety, and welfare of the public and how to protect the resource.

For instance, when designing the entry road into a fishing access site, I imagine the whole sensory experience of the visitor. I walk the site to determine where the road could curve slightly to provide a vista of, say, a mountain in the distance, and where to open up various sight lines to the river. I make sure paths and roads don't get too close to the shoreline, where they might damage riparian habitat.

After my concept of a new or improved site is approved by the team, one of our construction project managers prepares the technical drawings, puts the job out to bid, and then supervises the entire construction process.

For me, the joy of this job is seeing a family at a state park campground or fishing access site that I designed, or watching parents put their kids into a boat at a boat ramp—a ramp that's friendly to the resource and is making smart use of the angler license dollars that paid for it. Knowing I'm contributing to that family recreational experience is awesome.



Last spring, **KEVIN LEAGUE** hiked through intermittent downpours to Memorial Falls in the Little Belt Mountains near Kings Hill Pass, between Great Falls and White Sulphur Springs. "It was one of those spring days, in what's usually a drier part of the state, where everything is soaking wet and it looks and feels like you're in West Glacier," the Helena photographer says. "All that wetness in the photo makes the colors really pop, especially that lime green color in the Douglas fir's new growth. I also love how that clear water is rolling over the rocks. Looking at it now, the whole scene is soothing and calming, which is ironic. During the shoot, the water coming over the falls was roaring, the skies were dark and angry, and I was struggling to keep my footing as I stood in the creek trying to capture the moment." ■

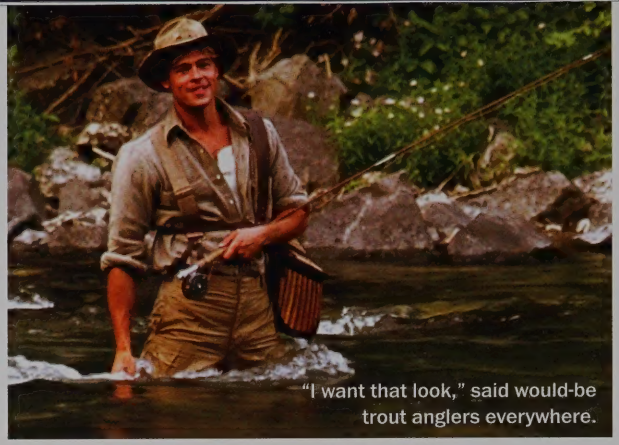
$761,057

Total dollars that FWP paid to Montana counties in 2015 in lieu of property taxes for state wildlife management areas, fishing access sites, and state parks.

Where (not?) to fish

Fishing popular trout rivers can be a mixed blessing. They are popular because they offer great fishing. But all that use can mean crowded conditions. Below are the top 10 most fished river stretches in Montana (2015 data), in order of total "user days." Beat the crowds by fishing a few miles downstream from popular put-in sites in the morning, then fish above them in the afternoon:

- **Missouri River** (Holter Dam to Cascade Bridge)
- **Madison River** (Hebgen Dam to Ennis Lake)
- **Bighorn River** (Afterbay to Bighorn FAS)
- **Gallatin River** (Headwaters to Spanish Creek)
- **Bitterroot River** (Headwaters to Big Creek)
- **Madison River** (Ennis Dam to Three Forks)
- **Gallatin River** (Spanish Creek to East Gallatin River)
- **Bighorn River** (Bighorn FAS to Little Bighorn River)
- **Yellowstone River** (Pine Creek to Shields River)
- **Clark Fork River** (Bitterroot River to Flathead River)



"I want that look," said would-be trout anglers everywhere.

MEDIA

Sparking a movement

Twenty-five years ago, in theaters across the United States, lights went down, projectors started up, and millions of Americans swooned over Montana's sparkling rivers and majestic mountains along with Brad Pitt's heroic angling escapades. In the summer of 1992, the film adaptation of Norman Maclean's *A River Runs Through It* was released. The book and movie tell the story of two brothers in the 1930s growing up near Montana's Blackfoot River under the eye of a stern-but-encouraging minister father. All three love to fish for trout, a pastime given equal status with religion in the household.

The combination of a well-told story, breathtaking river and mountain scenery (fishing scenes actually took place on the Gallatin, upper Yellowstone, and Boulder Rivers), the sight of large trout gulping bushy dry flies, and Pitt's square jaw inspired a generation of anglers to take up fly-fishing and make a pilgrimage to Montana. Many came and never left.

As fishing pressure on Montana rivers rapidly grew, native anglers, long accustomed to having trout waters to themselves, cursed what they called "The Movie." Outfitters, fly shops, and realty companies took a more upbeat attitude, as neophyte anglers and new residents eagerly tried to buy their way into the romantic Montana lifestyle.

"No film has had more of an impact on Montana tourism," Sten Iversen, manager of the Montana Film Office, said to a reporter in 2007. In 2012, John Maclean, Norman's son, told the *Missoulian* that the film "certainly changed fly-fishing, and it probably changed the state of Montana."

On the movie's silver anniversary, most native Montanans have adjusted to—if not fully accepted—the increased angling pressure, traffic, and housing development that resulted from both the movie and growing national interest in the West's public lands and abundant outdoor recreation. The film was released before many of today's anglers were even born. "What movie?" they ask.

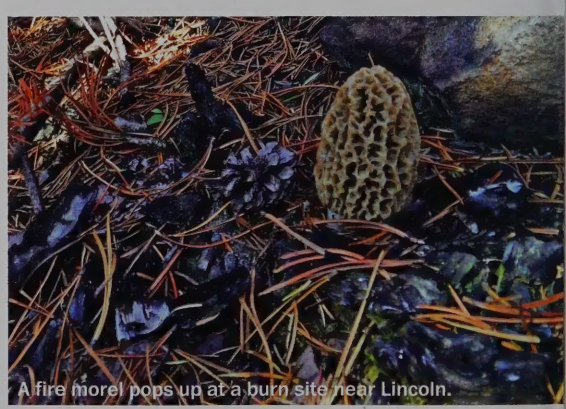
Still, there's no denying that scenes of a film star battling a five-pound rainbow trout through boulder-strewn rapids caused many theatergoers to book a flight to Montana. The next time you find yourself cursing a crowded fishing access site parking lot or overfished river bend, go ahead and blame it on director Robert Redford. Deep down, however, we all know that Montana's spectacular beauty, extraordinary trout fishing, and expansive landscapes made it only a matter of time before the rest of the world came here, looked around, and started calling outfitters and real-estate agents. Movie or not. ■

FORAGING

Where there's smoke, there's morels (the next year)

The best place to find morels is where a forest fire burned the previous year. For this year's morelling season, that means finding 2016 fire sites.

Check the U.S. Forest Service's InciWeb website (Google "Montana Fires"). Once on the site, go to the Data Filter in the right-hand column and look for "Inactive Fires" from the past 365 days and hit "Set." The site will show all fires from the previous year, named under "Incident." Look for public land fire sites near roads or trails. A burned area that's 10 miles in the middle of wilderness won't be accessible to any but the most intrepid. Click the burn name (such as "Nez Perce Fire") for more information, which often includes a map, news releases, and lists of trails that were closed when the fire was active (but that now could be your way of reaching the morel-rich area).

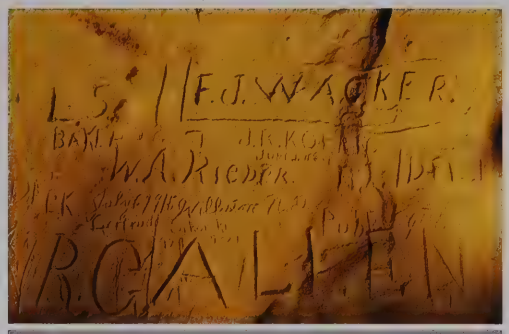


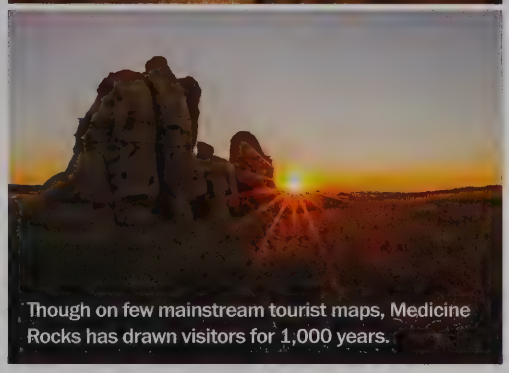
A fire morel pops up at a burn site near Lincoln.

For information on when and how to find morels at a fire site, see "Secrets of a Morelling Master" (March-April 2015) on the *Montana Outdoors* website: fwp.mt.gov/mtoutdoors/. ■

STATE PARKS

Medicine Rocks State Park gains national historic recognition





Though on few mainstream tourist maps, Medicine Rocks has drawn visitors for 1,000 years.

In January, Medicine Rocks State Park, 75 miles southeast of Miles City, was accepted into the National Register of Historic Places, a list of historic and archaeological sites that meet specific criteria for heritage significance.

Medicine Rocks State Park is home to 161 fantastical sandstone hoodoos, formed when a prehistoric river cut through ocean floor bedrock.

These eerie rock formations have drawn visitors for millennia. The Arikara, Assiniboine, Mandan, Gros Ventre, Sioux, and Cheyenne considered it a holy site. In 1883, Theodore Roosevelt described it "as the most fantastically beautiful a place as I have ever seen." The hoodoos contain over 10,000 historic and prehistoric inscriptions dating back 1,000 years.

Including Medicine Rocks, Montana now has 11 state parks on the register, in addition to the seven parks designated as National Historic Landmarks—the nation's most significant heritage sites.

"The listing of Medicine Rocks wouldn't have happened without Tim Urbaniak, a professor at MSU-Billings," says Sara Scott, Heritage Resource Program manager with the FWP State Parks Division. "Tim recruited students to document each inscription, along with its location and historic significance, within the park."

National Register of Historic Places designation qualifies the park to obtain state and federal grants for preservation, restoration, and interpretation. ■

FREE POSTERS TO GOOD HOMES

The Missoula County Weed District is offering, at no charge, three beautiful posters depicting native plants, invasive plants, and noxious weeds. "We want people to appreciate native plants and understand the threat of problem species," says Steffany Rogge, the district's weed education coordinator. "People need to know what the good plants and the bad plants look like." To order your set of three posters, contact Rogge at steffany@missoulaeduplace.org or (406) 258-4211.

Keep fish wet to increase their odds of surviving

Though there's nothing wrong with harvesting fish within FWP regulations, a released fish is one that other anglers can catch in the future. But only if it's released correctly. Mishandling fish, especially trout in warm water, makes them more susceptible to disease and stress or can even kill them outright. To ensure that the fish you release will live to fight another day, follow these guidelines established by biologists, guides, and anglers:

- **Land the fish quickly.** Do not play it to exhaustion.
- **Wet your hands before handling the fish.** Avoid removing its protective slime coating.
- **Try to keep the fish underwater so it can breathe.** Take no longer than 10 seconds to photograph a fish lifted out of the water.
- **Remove the hook quickly.** Use barbless hooks for faster removal.
- **Let the fish recover in the water before release.** Make sure it is upright and ready to swim away.
- **Don't release a fish into whitewater, where it can bounce against rocks during recovery.** Let it go in calm water.
- **If the fish is bleeding or hooked deeply, snip the line at its mouth.** Or consider keeping it if harvest regulations allow.

CLOCKWISE FROM TOP LEFT: CARTOON ILLUSTRATION BY MIKE MORAN; COLUMBIA PICTURES; ED KEMMICK/*LAST BEST NEWS*; ERIK PETERSEN; PAT CLAYTON/ENGBRETSON UNDERWATER PHOTOGRAPHY; MISSOULA COUNTY WEED DISTRICT; TOM DICKSON/*MONTANA OUTDOORS*; SHUTTERSTOCK

A Fresh Look at the Fisheries

Montana's new fisheries chief talks about illegal stocking, invasive species, and why native fish are such a priority.

Eileen Ryce, FWP Fisheries Division administrator

For the past year, since she was named the Montana Fish, Wildlife & Parks Fisheries Division administrator, Eileen Ryce has overseen one of the nation's most publicized fisheries management programs. The 42-year-old FWP fisheries "chief," as the position is commonly called, is responsible for 400 employees who protect and restore fisheries habitat for recreational species and species of concern, manage some of the world's most famous trout rivers, operate 12 hatcheries, work to prevent the introduction and spread of aquatic invasive species, and maintain 335 fishing access sites.

Montana Outdoors sat down with Ryce to talk about the current state of Montana's diverse and valuable fisheries.

MONTANA OUTDOORS: ***Right off the bat, how did you end up here as head of the FWP Fisheries Division?***

EILEEN RYCE: I started working for the division in 2004 managing its new Aquatic Invasive Species Program. In 2011 I was hired as chief of the Hatchery Bureau, and then last year I was named division administrator. I still wake up some mornings and can't believe I'm walking in the footsteps of Montana fisheries leaders who came before me, like Larry Peterman and Chris Hunter. It's a huge honor—and, to be truthful, a bit daunting—to be considered worthy of carrying on their legacy.

MO: ***Anyone who has heard you talk will recognize your brogue. How did you end up so far from home, and do you think your background gives you a perspective on Montana's fisheries that people born here might not have?***

ER: I grew up in Scotland and moved here in 1997 to do my PhD in aquatic invasive species ecology at Montana State University. This year is my 20th anniversary in Montana.

One advantage, if you can call it that, of coming from outside Montana is that I continue to be amazed at the remarkable fisheries resources here. The anglers, landowners, and fisheries biologists who came before us left behind some extraordinary fisheries for us to enjoy. Each day I'm amazed and appreciative of that, and it makes me all the more determined to conserve those fisheries for future generations.

MO: ***Though you've worked all your 12 years at FWP here in Helena, it seems that you have developed a lot of goodwill with field staff and fishing organizations. How did that happen?***

ER: One reason is that my husband, Lee Nelson, was for a long time the FWP fisheries biologist in Townsend, so I literally married into the Fisheries Division. The biologists and technicians across Montana have been part of my social and professional life for years, and I worked closely with our remarkable hatchery crews across the state. As for the NGOs [nongovernmental organizations], I got to know several of them, especially Walleyes Unlimited and Trout Unlimited, during my time as hatcheries chief.

MO: ***Illegal fish stocking is a growing problem, especially west of the Continental Divide. Because it can be done in remote areas at night, it's especially difficult to prevent. Can FWP do anything to stop it?***

ER: It is a huge problem, and we, along with local communities and anglers and fishing groups, are very concerned. Illegal fish stocking—like putting perch or northern pike into a lake—can ruin existing fisheries.

The state can increase penalties and try to boost enforcement, but ultimately it comes down to anglers monitoring themselves. Anglers need to recognize that certain species should not be in waters where they are not suited—like walleyes west of the Divide or northern pike in Canyon Ferry.

We have abundant fishing opportunities for many species in many places in Montana, but not all types of fish belong together. This isn't North Dakota, where walleye, perch, and northern pike can exist statewide without causing problems for other species. Our existing fisheries are just too recreationally and economically valuable to mess around with. More and more anglers are realizing that their home waters and fisheries are under threat from a few selfish lawbreakers.

MO: ***What's the status of Montana's most popular fisheries?***

ER: There's lots of good news. Fort Peck and Canyon Ferry Reservoirs have been fishing great these past few years. A real sleeper lately has been Fresno, near Havre. If you like to catch walleye—including from shore—

I recommend heading there right now.

The Bighorn River is still producing huge numbers of trout, and the Madison River's rainbow population has bounced back to pre-whirling disease levels. The Missouri downstream of Holter Dam continues to hold more big trout per mile than any other river stretch in Montana. What am I missing? Oh yes, the Gallatin, Bitterroot, Yellowstone, and Clark Fork are all fishing really well, and the Big Hole remains one of the nation's premier fly-fishing destinations, especially during the salmonfly hatch.

Our biggest concern over the past decade for Montana's river and stream fisheries has been warming water temperatures and lower flows. That is stressing fish, making them more susceptible to disease and parasites, like we saw with mountain whitefish on the Yellowstone last summer. It also forces us to temporarily restrict hours or even close waters to protect fish from the stress of being caught, reeled in, and released.

It looks like we could have an excellent snowpack this spring, and that bodes well for summer flows. Unfortunately, big runoffs are becoming an anomaly and not the normal state of things, as was the case 20 years ago.

MO: ***River conflicts are increasing on the Bitterroot, Blackfoot, Madison, Bighorn, and Missouri Rivers, as well as Rock Creek. The main issue is overcrowding, but there's also concern about garbage cleanup, vandalism, trespassing, parking, and public safety. What's the solution?***

ER: The key to resolving these conflicts is for local users to meet and try to reach some reasonable compromises on their own, with FWP staff acting as advisers. That's happened already on the Blackfoot, Madison, and a few other rivers. We encourage river users to find local solutions rather than look for rulings by the Montana Legislature or FWP in Helena. In some cases, just some new signage on common courtesy, or bringing in an FWP river ranger to enforce existing regulations, might be all that's needed. Unlike anglers, the growing number of tubers, kayakers, and other river users don't pay fees. As a result, we lack adequate funding to maintain fishing access sites and manage public use on some of the most heavily used waters.

MO: ***Any other major concerns that Montana anglers should be aware of?***

ER: Definitely the threat of aquatic invasive species. That's huge right now with the discovery last fall of invasive mussel larvae—it's impossible to tell if they are zebra or quagga mussels at that life stage—in Tiber and Canyon Ferry Reservoirs. It's been a huge wake-up call for legislators, communities, and anglers. Everyone in the state needs to work together to stop the spread of invasive species within Montana and keep new ones from crossing state borders.

For anglers, that means getting dead serious about cleaning, draining, and drying their boats, bait buckets, boots, waders, and other gear. (For more on Montana's invasive mussel crisis, see page 4—*Ed.*)

> "It's sad to envision a Montana future where children never have a chance to catch a native cutthroat trout or grayling like my daughter still can. We're not going to let that happen."

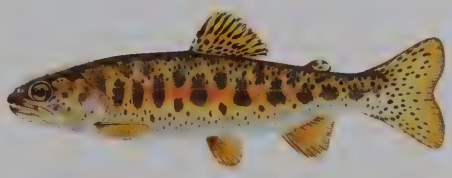


PHOTO BY THOM BRIDGE; INLAND REDBAND TROUT ILLUSTRATION BY JOSEPH TOMELLERI

MO: ***The Fisheries Division focuses a lot of time and money on native species. Why has that become such a priority?***

ER: Our main coldwater fisheries, which hold primarily non-native rainbow and brown trout, are, for the most part, doing very well. While we have issues like overcrowding, the fish populations are in good shape.

But native westslope cutthroat, Arctic grayling, bull trout, and white and pallid sturgeon fisheries are struggling. Those species occupy only a small fraction of their historic range. I think about the native species that Lewis and Clark saw when they came here 200 years ago, and I believe we have an obligation to make sure those species are still here 200 years from now. It's sad to envision a Montana future where children never have a chance to catch a cutthroat trout or grayling like my daughter still can. We're not going to let that happen.

Our division is making great strides with native species management. The fact that we kept the grayling from being listed as a federally endangered species proved we can manage that species. Coming from the Hatchery Bureau, I'm especially proud of the work our crews have done to rear native species like grayling, cutthroat, and pallid sturgeon as part of the division's restoration efforts. The work by our biologists to restore westslope cutthroat in lakes and streams of the South Fork of the Flathead watershed has been remarkable, and I'm excited about new plans to do similar work in the upper North Fork of the Blackfoot.

We still have challenges with the federally listed bull trout and pallid sturgeon. I've been very impressed with our crews in eastern Montana and the work they've been doing for going on two decades. They have done groundbreaking research on pallids and are fighting for better water-release regimes at Fort Peck Dam and improved fish passage at Intake Dam to ensure that this species—one of the most endangered in North America—doesn't disappear entirely. They recognize what a national tragedy that would be. The same goes for our western Montana biologists, who have been doing all they can to restore and protect bull trout habitat since the species was listed in 1998.

MO: ***Let's end this on a personal note. Fishing season is underway across the state. What kind of fishing do you like best?***

ER: Really, it's any type where I get to spend time with my eight-year-old daughter Fiona. I'm happy to fly-fish with her on the Missouri, or just sit on the bank of a kids fishing pond together, tossing out a worm and a bobber. The main thing is being with family and getting outside and enjoying the resource. If it's a walleye, a rainbow, a cutthroat, or even a goldeye on the end of the line, that doesn't really matter to me.

FROM Banning TNT TO Scanning DNA

What 100-plus years of fisheries management says about Montana and its people.

By Amber Steed and Tom Dickson

You can learn a lot about Montana's changing values and priorities over the past century by studying the state's literature, art, and politics—and fisheries management.

It's true. How Montanans regard their streams, rivers, lakes, and fish populations—and how the state has responded—underscores a growing appreciation of and desire to protect these and other natural resources.

People have always wanted to catch fish in Montana—from trout in remote mountain lakes and scenic valley rivers to, in later years, walleye and other species in vast reservoirs. Historically, Salish and Kootenai Indians captured spawning bull trout using willow traps and rock weirs. In the late 19th century, commercial fishermen netted truckloads of trout for local markets. Families in the early 1900s used hook and line to fill baskets of fish to stock their larders.

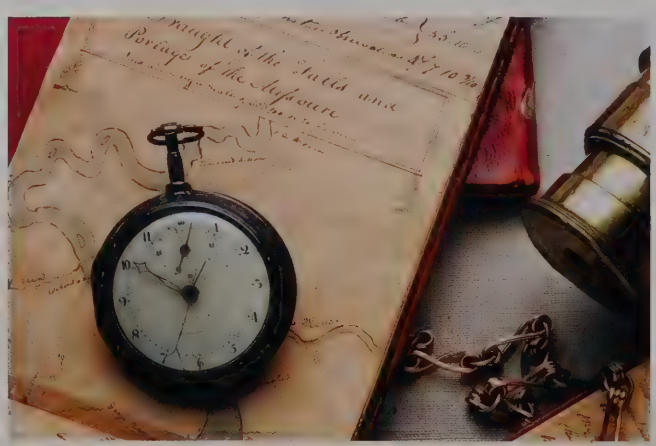
Recreational angling also has a long history here. "I amused myself in fishing," Captain Meriwether Lewis wrote in 1805 after catching westslope cutthroat trout below the Great Falls of the Missouri River. Today flotillas of drift boats moving down the Madison, Bighorn, Yellowstone, and Bitterroot Rivers in midsummer embody that passion. For some anglers, fishing for native species—cutthroat trout and sauger especially—has become a pleasure in itself.

No matter why Montanans fish, they have always insisted that the state maintain abundant populations. How the Montana Fish, Wildlife & Parks Fisheries Division has responded to that challenge over the past century is a story of evolving public values, scientific breakthroughs, and political leadership.

Extract at all costs

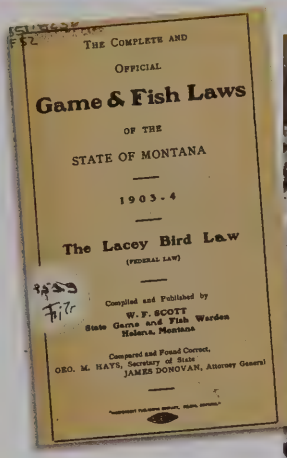
Trout conservation was the last thing anyone considered in the spring of 1886, when, on the first log drive down the Blackfoot River, 20 million board feet of timber was sent downstream to the Montana Improvement Company's Bonner mill. At the time, and for decades thereafter, Montanans sawed, mined, and plowed as much timber, minerals, and prairie as possible to feed the state's increasing population and fuel its burgeoning economy. How resource extraction affected water, soil, and fish and wildlife was of little concern—at first.

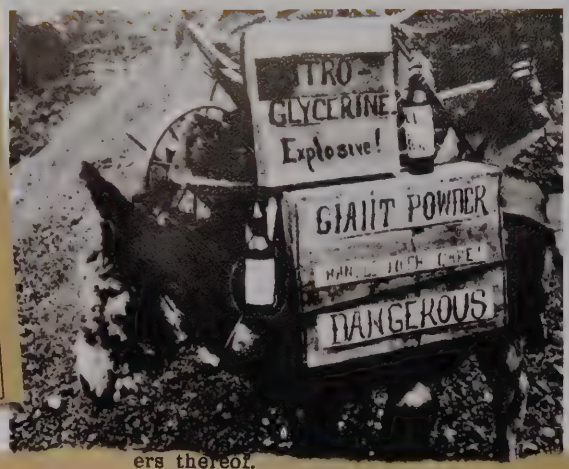
Montana's window of seemingly inexhaustible natural resources was brief. Bison, elk, beaver, and other land animals were nearly gone from most of the state by the late 1800s. Fisheries suffered, too. Explosives, seines, poisons, and other destructive or large-scale harvest methods rapidly depleted trout populations. New dams stopped fish from reaching spawning habitat. Irrigators drained creeks to water crops in late summer. Communities used streams as sewage canals. As early as 1891, the U.S. Fish Commission reported that it "did not find any fish" when netting the Clark Fork near Deer Lodge because of toxic runoff from copper smelting upstream in the Butte-Anaconda area.



EARLY PERSEPCTIVES The journals of Lewis and Clark (above) were the first documentation of the northern Rockies' abundant fisheries. Early settlers and then recreationists, like these at Yellowstone National Park (right) exploited the resource, assuming it was limitless.

Intent as they were on building towns, railroads, dams, mines, and more, it took a while for Montanans to notice that fish stocks, previously so abundant, were dwindling. One of Montana's first fishing regulations, passed in 1897, made it illegal to use dynamite (known as "giant powder") for "catching, stunning, or killing fish." Other early regulations required a license to fish, registration of all fish ponds with the Board of Fish and Game Commissioners (established in 1895), fish screens on irrigation intakes to prevent stranding fish in hay fields, and that mills stop dumping





ers thereof.

Use of giant powder or other explosive compounds.

H. B. No. 123
S. L. 1897

Sec. 13. If any person, or persons, shall use any giant powder or other explosive compounds for the purpose of catching or killing fish, he shall be deemed guilty of a felony, and upon conviction thereof, shall be punished by a fine not less than Two Hundred

BOOM YEARS Early fish management consisted of ending destructive and large-scale harvest methods, like using dynamite, known as "giant powder."

sawdust into streams and rivers.

Now Montana had fish and game regulations—but no one to enforce compliance. "The vastness of Montana Territory increased the difficulty in enforcing wildlife laws, and the Legislature was particularly lax regarding enforcement," historian Joan Louise Brownell wrote in *The Genesis of Wildlife Conservation in Montana*. Finally, in 1901, the state hired its first game warden, W. F. Scott, who appointed eight deputy wardens across the state. Though only rudimentary, fisheries management was under way.

Stock, then stock more

By the early 20th century, regulations and enforcement had addressed environmental degradation—such as by outlawing mining waste in public waters. But industrial and municipal development continued ever faster. Silt from eroding clear-cut hillsides suffocated trout eggs. Factories dumped industrial waste in rivers and streams. Native fish like cutthroat trout and bull trout that evolved in clean, clear water couldn't survive the contamination and relentless overharvest. Yet Montanans still wanted to catch fish.

Capitalizing on recent breakthroughs in salmonid cultivation elsewhere in the United States, Montana began to use hatcheries to grow fish—primarily nonnative rainbow, brown, lake, and brook trout—and release them for public recreation. Stocking fish quickly became the state's top fisheries-management priority. It not only replaced fish stocks depleted by pollution but also allowed crews to put trout in fishless mountain lakes and stock newly created reservoirs. "Practically every accessible water in the state received fish of some kind at the discretion of the planter and without regard to actual need or desirability," former state fisheries chief William Alvord wrote in his history of Montana fisheries management.

The U.S. Fish Commission built the Bozeman National Fish Hatchery in 1896 to produce rainbow and brook trout. The first state-owned hatchery opened in Anaconda in 1908, followed by 13 more by 1925. Private hatcheries, operated by local sportsmen's groups, popped up just as quickly. Montana established fish stations on various streams in the 1920s to take eggs and milt from wild populations for the hatcheries. In 1933 alone, fisheries workers harvested 22 million brown trout eggs in the Madison River drainage and 12 million rainbow trout eggs at Hebgen Lake. "Fishermen were accustomed to seeing hatchery trucks plant the Madison [River] and naturally associated catching trout with the hatchery," a 1985 *Montana Outdoors* article on trout

REPLENISHING STOCKS Montana's first fish distribution vehicle (above) and train, "Thymallus," (above right) were used to stock fish statewide. Trout were also carted in milk cans by mule and trucked in crates (right) to backcountry lakes devoid of game fish.

Amber Steed is an FWP fisheries biologist in Kalispell. Tom Dickson is editor of Montana Outdoors.

Timeline

Montana Fisheries Management

1889 Montana achieves statehood.

1895 The legislature establishes a Board of Game and Fish Commissioners.

1896 U.S. Fish Commission builds Montana's first fish hatchery north of Bozeman.

1901 The governor appoints the first state game warden, who then appoints eight deputies statewide.

Early 1900s Rainbow trout from California's McCloud River drainage, brown trout, brook trout, and largemouth bass are introduced to Montana.

1905 Fishing licenses are required of Montana resident anglers.

1908 The first state fish hatchery is built in Anaconda.

1912 A federal hatchery is built in Somers.

1913 Daily bull trout limit set at 50 pounds

management noted.

The state reared fish for eastern Montana, too. Fisheries crews raised walleye, northern pike, largemouth bass, and other coolwater species for stocking in farm ponds, reservoirs, and rivers.

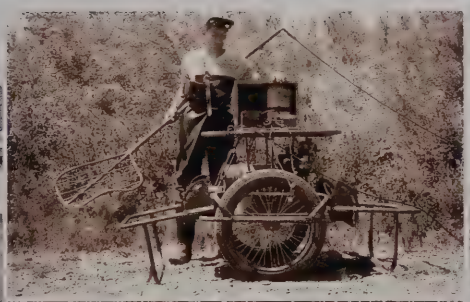
Science informing decisions

Stocking seemed like a foolproof way to keep Montana's waters filled with catchable fish. The sporting press certainly thought so. From the 1940s through '60s, Joe Brooks, Ted Trueblood, and other outdoors writers sang the praises of western trout rivers in *Field & Stream*, *Outdoor Life*, *Sports Afield*, and other national publications. Montana trout advocates like Dan Bailey and Bud Lilly built world-renowned fly shops and guiding services based on fishing for stocked rainbows and browns in the Yellowstone, Madison, and other storied rivers.

To improve the effectiveness of its stocking program, the Fisheries Division in 1947 created a fisheries biology section. The state's first fisheries biologist, Charles Phenicie, soon conducted groundbreaking scientific surveys of Montana's fish populations, streams, and rivers to better understand how stocked trout survived. As the 1950 federal Dingell-Johnson Act (which taxed angling gear to fund state fish conservation) and a new fisheries-management course at Montana State University added biologists and student volunteers to its ranks, the Fisheries Division began gathering vast amounts of data. Crews measured stream flows and conducted creel surveys to ask anglers about their catch. They used new electrofishing technology to capture fish, and applied biological science to age those fish.

By the mid-20th century, stocking still dominated Montana fisheries management, but biologists now used data from studies when making management decisions. Based on research, the Fisheries Division varied the

NATIONAL EXPOSURE Starting in the 1940s, outdoors magazines publicized Montana's great fishing, drawing people from across the United States to its waters, much to the ire of local anglers.



INNOVATING Early fisheries crews used primitive electroshocking equipment (above left and below left) to monitor stream populations. After World War II, they used airplanes (above) and later helicopters to deliver fish and equipment to remote areas inaccessible by vehicles.

1940
Completion of Fort Peck Dam creates Fort Peck Reservoir.

1947
FWP hires its first fisheries biologist and establishes a fisheries biology section.

1950
Congress enacts the Federal Aid in Sport Fish Restoration (Dingell-Johnson) Act.

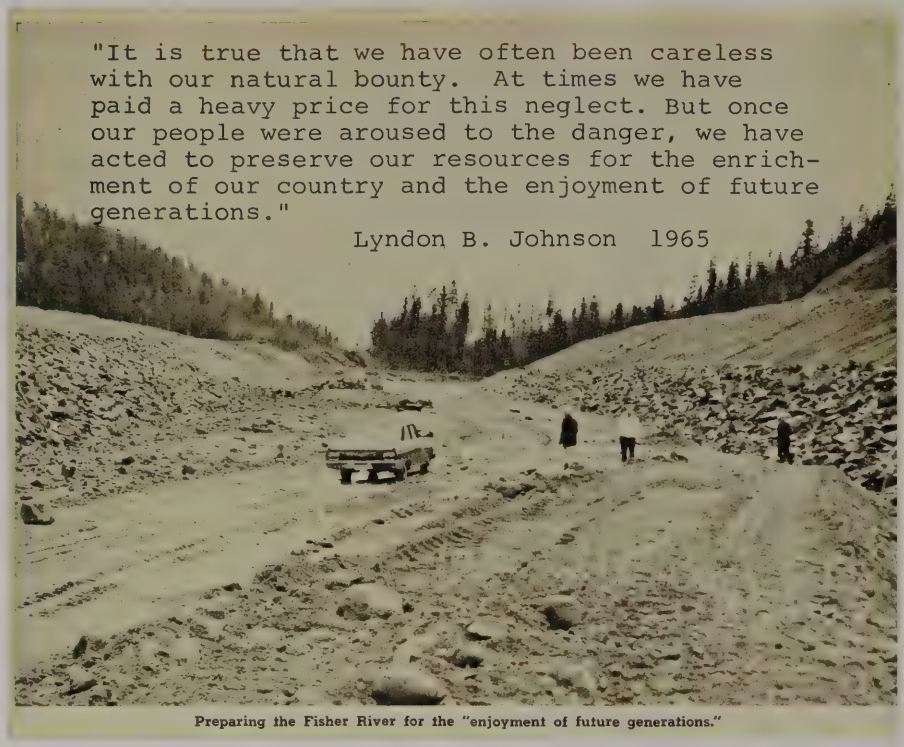
1954
Canyon Ferry Dam is built on the Missouri River, creating Canyon Ferry Reservoir.

1955
Montana passes a comprehensive water pollution control law.

1963
Montana passes the nation's first stream protection act.

1964
Fish and Game Commission drafts policy opposing mass aerial spraying of DDT.

1973
Congress passes the Endangered Species Act (ESA).


"It is true that we have often been careless with our natural bounty. At times we have paid a heavy price for this neglect. But once our people were aroused to the danger, we have acted to preserve our resources for the enrichment of our country and the enjoyment of future generations."
Lyndon B. Johnson 1965

Preparing the Fisher River for the "enjoyment of future generations."

ROAD RAGE During the mid-20th century, Montanans became increasingly concerned about river destruction in the name of highway construction. This image of the Fisher River in northwestern Montana is from "Ravage the River," *Montana Wildlife* magazine, February 1967.

REVOLUTIONARY RESEARCH Dick Vincent during his groundbreaking stocking study in the early 1970s

size of stocked fish, depending on species and water type. Starting in 1953, it was department policy to stock only cutthroat trout, rainbow trout, and Arctic grayling in streams, and all fish had to be at least six inches long. Concerned about the introduction of harmful species, fisheries managers employed scientific data in convincing Montana lawmakers to ban unauthorized stocking.

As they studied streams to better understand stocking success, fisheries crews also learned how human development damaged trout habitat. Montanans had become increasingly concerned about the rapid construction of two-lane highways being built or expanded across the state. "Montana's best waters are gradually disappearing [as] whole channels are being changed by the road builders," the Montana Fish and Game Department opined in a 1955 issue of *Montana Wildlife*. In response, the department launched a study of fish habitat in 13 western and central Montana streams before and after highway construction. The startling results—in some cases trout populations declined by as much as 75 percent—led to the Montana Stream Protection Act of 1963, the first bill of its kind in the United States.

New perspectives

By the 1950s, some fisheries biologists had begun to quietly question the effectiveness of stocking. "The idea then was that stocked fish were an addition to the wild populations, that two plus two equaled four," retired FWP biologist Dick Vincent said in a 2004 *Montana Outdoors* interview. "But a few of us wondered if maybe two plus two equaled three or even less." It was not until the early 1970s that a three-year study on the Madison River and nearby O'Dell Creek proved that stocking hatchery-reared fish in streams and rivers damaged existing wild trout populations and reduced the number of large trout for anglers. As biologists quit stocking rivers and restricted harvest regulations on popular trout waters to maintain populations, Montana entered the era of wild trout management.

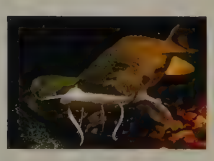
Meanwhile, both Montana and the nation had begun enacting laws to protect the environment and imperiled species. To address DDT pesticide runoff, pulp mill pollution, and mining waste, Montana passed a comprehensive water pollution control law in 1955. In 1972, Montana enacted a new state constitution that guaranteed a clean and healthful environment. Several years later, Montana conservationists, assisted by fisheries biologists armed with reams of scientific data, successfully fought efforts to dam the Yellowstone River

Mid-1970s Montana discontinues stocking trout in rivers and streams.

1975 Montana passes the Natural Streambed and Land Preservation Act ("310 Law").

1985 Montana passes the Stream Access Law.

1990 U.S. Fish & Wildlife Service lists the pallid sturgeon as endangered.



1992 *A River Runs Through It* is released, fueling interest in Montana fly-fishing.

1978 The Yellowstone River is saved from impoundment.

1987 FWP releases its first warmwater fish management plan.

NATIVE RIGHTS By the 1980s, biologists were looking more closely at indigenous fish, including cold-water species such as bull trout (above left) and coolwater species like burbot (above).

and turn the Paradise Valley into a series of reservoirs (see page 34).

Concerned about the disappearance of bald eagles and other popular wildlife, Congress passed the Endangered Species Act in 1973. In Montana, the law raised public awareness of the intrinsic value of native species, including fish, and compelled the state to begin efforts to recover bull trout, white and pallid sturgeon, westslope and Yellowstone cutthroat trout, and Arctic grayling.

In the 1980s, eastern Montana fisheries biologists began the first-ever surveys of prairie streams. Over time, crews seined 18,000 miles of streams and found 46 different fish species, 26 of them native, including the northern redbelly dace, emerald shiner, and Iowa darter. The surveys shed light on the rich diversity of aquatic life in eastern Montana.

One of the largest eastern Montana species was the pallid sturgeon, which was fast disappearing. Completion of Fort Peck Dam in 1940 had been a mixed blessing. By impounding the river, it eventually created a major walleye fishing destination. But it also blocked sturgeon from spawning waters upstream. On the Yellowstone River, Intake Diversion Dam similarly stymied the prehistoric fish. Despite years of Fisheries Division research on and advocacy for the federally protected species, adult pallid sturgeon numbers dropped to fewer than 100, making it one of the rarest fish in North America.

Like Fort Peck, dams elsewhere in Montana represented a fisheries paradox. Some created world-class trout waters, such as the Missouri River below Holter and the Bighorn River below Yellowtail. Others, such as a series of hydropower facilities on the lower Clark Fork River, blocked bull trout migration, hastening the decline of what became a federally threatened species.

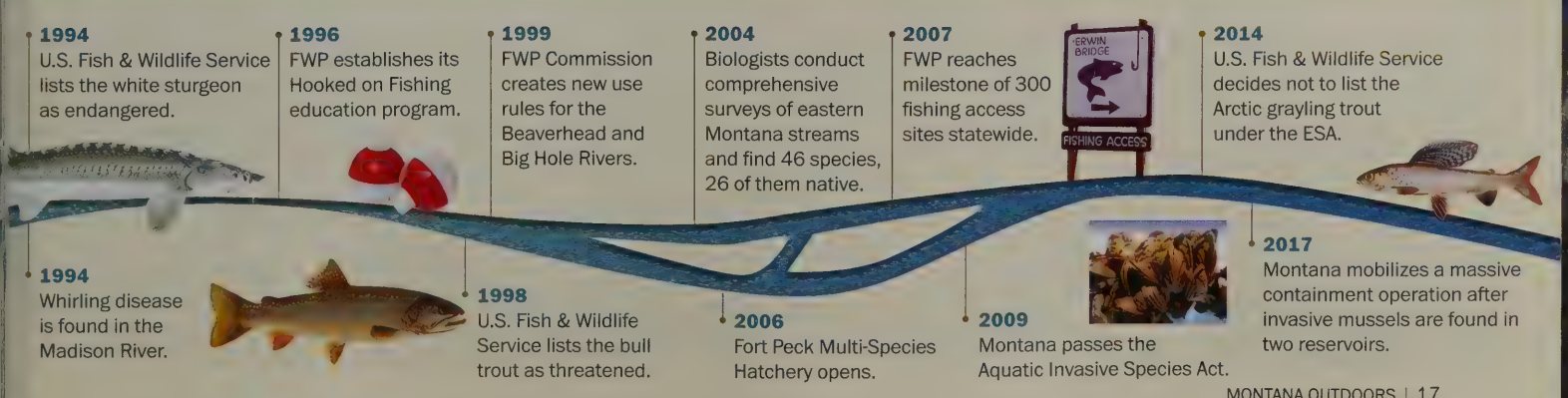
By the late 1980s, it seemed biologists could catch their breath. With the exception of dams, major threats to Montana's fisheries and fish habitats—municipal pollution, silt washing in from clear-cut mountainsides, stream channelization, and mining waste—were being reduced thanks to improved industrial practices and stricter laws. The Montana Legislature had also determined that fish survival was one "beneficial use" of river water, giving the Fisheries Division legal

The conundrum of catch-and-release

As Montana trout anglers became more environmentally conscious in the 1970s and '80s, a growing number began to reconsider the long-held practice of harvesting every fish they caught. Because family incomes were rising, fishing for food became less necessary. What's more, bass and Atlantic salmon anglers elsewhere in North America were proving that released game fish could be caught repeatedly.

For Montana fisheries managers, the growth of catch-and-release was a double-edged sword. It meant reduced concern about anglers overharvesting fish stocks. Yet fisheries biologists were less able to use harvest to manage fish populations. For instance, biologists say they could likely increase the average size of trout on some rivers if anglers would keep more fish, giving remaining trout more room and food. In other rivers, increased harvest of non-natives such as brown trout might increase dwindling native westslope cutthroat populations.

But even where legal and biologically justifiable, killing any trout on some Montana rivers has become a form of sacrilege. ■



1994 U.S. Fish & Wildlife Service lists the white sturgeon as endangered.

1994 Whirling disease is found in the Madison River.

1996 FWP establishes its Hooked on Fishing education program.

1998 U.S. Fish & Wildlife Service lists the bull trout as threatened.

1999 FWP Commission creates new use rules for the Beaverhead and Big Hole Rivers.

2004 Biologists conduct comprehensive surveys of eastern Montana streams and find 46 species, 26 of them native.

2006 Fort Peck Multi-Species Hatchery opens.

2007 FWP reaches milestone of 300 fishing access sites statewide.

2009 Montana passes the Aquatic Invasive Species Act.

2014 U.S. Fish & Wildlife Service decides not to list the Arctic grayling trout under the ESA.

2017 Montana mobilizes a massive containment operation after invasive mussels are found in two reservoirs.

means to maintain flows to benefit trout and other species. In 1984, the Montana Supreme Court ruled in favor of public access to streams and rivers, accelerating the eventual development of more than 300 fishing access sites and boosting fishing recreation that funded fisheries management.

But even with these achievements, fisheries biologists could not relax. Montana was becoming a victim of its own success.

Dealing with newcomers

For years, movies, tourism campaigns, and rhapsodic reports from outdoors writers depicted Montana as a western paradise. People flocked to the scenic state to put down roots or just wave a fly rod for a week. The influx led to increased streamside housing development, growing threats of fish disease and harmful invasive species, and mounting pressure on the state's finite fish populations.

The Fisheries Division responded with vigorous scientific study using sophisticated tools. Biologists surgically implanted tiny radio transmitters into fish to track where species spawned so those waters could be protected. They retooled fish hatcheries to raise native species like Arctic grayling for restoration projects. Biologists found ways to improve survival rates of stocked game species like rainbow trout, began analyzing DNA residue in streams to determine which fish species lived there, and created computerized maps showing the disappearance of genetically pure cutthroat from 90 percent of the species' historic range.

In response to growing public demand for walleye on Fort Peck Reservoir, biologists teamed with local anglers to strip eggs and milt of spawning fish for hatchery propagation. Using science-based guidelines, FWP now stocks millions of newly hatched fish in Fort Peck each year to produce one of the nation's most acclaimed walleye fisheries.

The dangers of fish pathogens made state and national headlines in 1994 when biologists discovered that whirling disease was devastating the Madison River's rainbow trout population. Disease had long been on biologists' radar. As early as 1969, they convinced Montana legislators to ban the import of infected fish and create the state's first fish-health program. Working with state and federal fish labs, biologists detected diseases in wild and reared fish, inspected hatcheries, and responded to outbreaks.

Though the Madison's rainbow population rebounded—perhaps because surviving trout passed disease-resistant genes to new generations—whirling disease remains in many Montana trout streams. Biologists also monitor for proliferative kidney disease (PKD) and

DNA AND AIS By the 2000s, the Fisheries Division had begun using advanced science, such as environmental DNA (above), to monitor fish populations. It also began watercraft inspections to keep aquatic invasive species like Eurasian watermilfoil (right and far right) from entering and degrading Montana waters.

Two key habitat protection laws

Concerned about alterations to rivers and streams, Montanans pushed for laws limiting riparian development.

One of Montana's most important legal tools for conserving stream habitat is the 1975 Natural Streambed and Land Preservation Act (known as the "310 Law" because it originated as HB 310). Under this law, private landowners must obtain a permit from the local conservation district for any project that might modify a streambed or stream bank. The local FWP biologist is part of a team that reviews the permit application. That ensures scientific and technical review of how a housing or other streamside development might add silt to spawning beds, reduce pool depth, remove streamside vegetation, or otherwise harm fish habitat.

This landmark legislation came 10 years after Montana lawmakers permanently reauthorized a similar groundbreaking law, the Stream Protection Act (initially passed in 1963). That legislation required public agencies to consider the harm that highway construction and other development could cause to stream channels. As a result, the Montana Department of Transportation now routinely widens road culverts so fish can pass, increases bridge spans to allow rivers more room to naturally meander, and builds bridges over streams rather than straightening waterways to run parallel to new roads ("channelization"), as was the previous practice. ■

BROADENING THE SCOPE By the 1990s, the Fisheries Division was running large-scale management programs in central and eastern Montana. At Fort Peck Reservoir, fisheries crews and volunteers harvested walleye eggs and milt to propagate fry and fingerlings stocked in the massive impoundment. As they were raising fish, biologists were also raising concerns about ill-timed water releases from Fort Peck Dam that disrupted pallid sturgeon reproductive habitat (above left). On rivers, FWP intensified fisheries management for coolwater, warmwater (weighing channel catfish on the lower Yellowstone River, above right), and coldwater species (electrofishing trout on the Missouri River near Craig, below left). Sophisticated technology—like the sliver-sized tag in the snouts of these hatchery-reared pallid sturgeon planted in the lower Yellowstone River (below right)—allows biologists to follow even small fish to see what habitats they use throughout the year.

infectious *hematopoietic necrosis* (IHN) virus, both of which can wipe out hatchery stocks and threaten wild populations.

Also concerning Montanans—and FWP fisheries biologists—are aquatic invasive plants and animals. Already some Montana waters are beset by New Zealand mud snails, Eurasian watermilfoil, and curly-leaf pondweed. The Fisheries Division's Aquatic Invasive Species (AIS) staff work with legislators, businesses, fishing groups, and communities to check the spread of these unwanted species and prevent new infestations. Crews inspect and clean thousands of boats each summer at check stations. Billboards and radio and TV announcements urge boaters to "Clean, Drain, Dry" their craft. In early 2017, after detection of the first invasive mussel larvae in Montana waters, FWP and other agencies and partners mobilized a massive containment operation.

What's in store?

Montanans' values and priorities regarding their fisheries, streams, and rivers continue to evolve. Jobs and economic growth remain essential, but now clean water and abundant outdoor recreation do, too. Though anglers still want to catch non-native rainbow and brown trout, perch, and walleye, they increasingly value bull trout, sauger, and other indigenous fish. Aquatic invasive species, for years not even on most peoples' radar, are now seen as major threats to Montana ecosystems, industry, and agriculture.

For fisheries biologists, responding to public demands will become harder and more complex. Housing and commercial development near streams and rivers continues to intensify. Growing angling pressure and recreational use such as personal watercraft riding, whitewater rafting, and kayaking create overcrowding and conflict. These days, managing fisheries can be as much about sociology as it is about science.

Then there's climate change. Hotter-than-average summers are straining many fisheries. Trout and grayling especially struggle to survive in waters that become too low, too warm, or both.

Despite the challenges, fisheries biologists remain hopeful. Montana remains America's premier trout-fishing destination. Walleye size and catch rates far exceed national averages. Biologists know more about native fish—from sauger and blue suckers to northern pikeminnows and bull trout—than ever and are using that knowledge to conserve those populations. Biologists also stay abreast of fast-changing technology and science to better understand, protect, and manage Montana's fisheries. Financially, the Fisheries Division continues to find new ways to bolster traditional funding sources to keep up with growing public demands. And even though invasive mussels have arrived, FWP and other agencies have the knowledge, resources, and, hopefully, public cooperation necessary to limit the species' spread within the state.

Perhaps most encouraging for Montana's future fisheries are the anglers and others who care so much about the state's waters. Biologists can't manage fish populations on their own. Collaborating with landowners, lawmakers, fishing groups, and other agencies, the FWP Fisheries Division secures conservation easements, maintains water flows, increases public fishing access, and promotes effective legislation. Using smart, community-based conservation work, Montana has kept the grayling and cutthroat trout from unnecessarily being listed as endangered.

Fisheries management in Montana has changed dramatically since the days of simply banning dynamite and poisons. And it will continue to evolve in years to come. What won't change is biologists' commitment to, and public demand for, conserving Montana's vast and valuable aquatic resources.

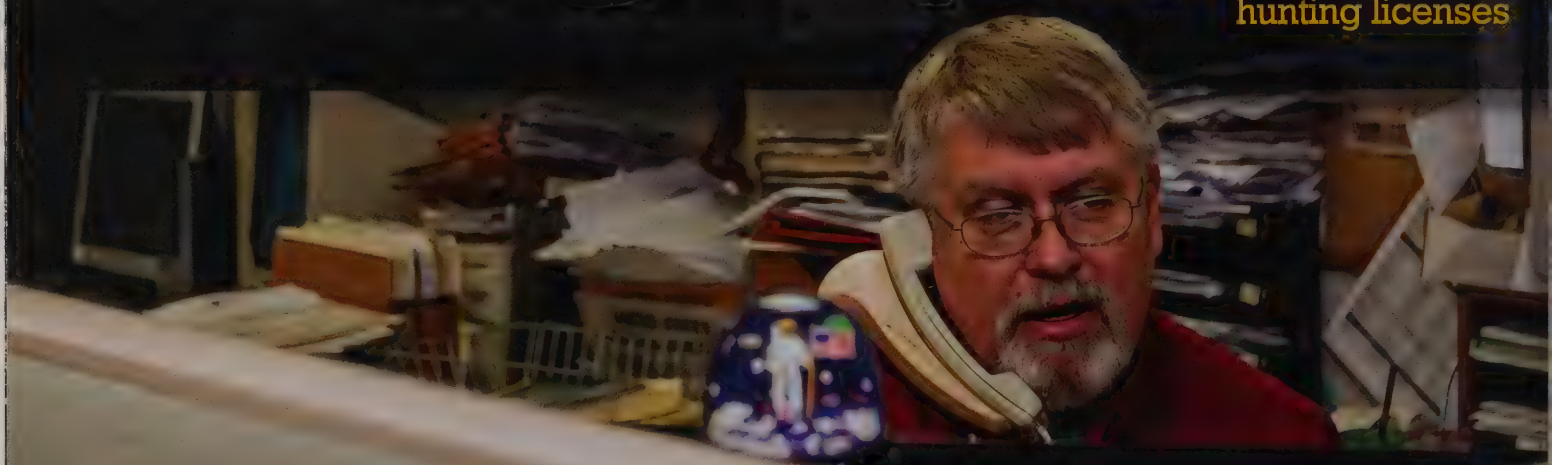
TEAMWORK Partnerships have become essential for effective fisheries management. On the upper Big Hole River, FWP biologists and landowners (above) established conservation measures that kept the Arctic grayling (left) from being listed as a federally endangered species.

SAME CONCEPT, NEW SPECIES A century ago, Montana fish hatcheries were used solely to produce non-native fish. Today, some fish hatcheries, like at Sekoknoni Springs near West Glacier (above), propagate westslope cutthroat trout and other native species used for conservation projects. As has been the case since statehood, fisheries management continues to reflect the values and concerns of anglers and others. Residents and nonresident visitors still want to catch fish, just as they did in the late 19th century. But equally important to a growing number of Montanans and tourists are the native species, clean water, and scenic landscapes that go hand in hand with healthy, well-managed fisheries.

CLOCKWISE FROM TOP LEFT: THOMAS LEE; PAUL N. QUENEAU; BEN PIERCE; PATRICK CLAYTON/ENGBRETSON UNDERWATER PHOTOGRAPHY

The Big Day

Behind the scenes at FWP's annual lottery drawing for moose, bighorn sheep, and mountain goat hunting licenses



SYMPATHETIC EAR The day after the lottery drawings, Neal Whitney fields phone calls from hunters frustrated that they weren't drawn for a license. "We feel their pain. We're hunters ourselves," he says.

READY, SET, WAIT Caley Chadwick, Coleen Carroll, and Neal Whitney of the FWP Licensing Bureau watch as colleague Marsha Ogle starts the 2016 moose license lottery. Seconds later, a "Please Wait" notification appears on her screen as the computer begin to process the enormous amount of data derived from tens of thousands of hunter applicants.

By Tom Dickson
Photos by Nicole Keintz

Just before 7 a.m., on June 13, in the basement of the Montana Fish, Wildlife & Parks headquarters in Helena, Marsha Ogle is waiting to begin the lottery drawings for Montana's 2016 moose, bighorn sheep, and mountain goat hunting licenses.

"Go ahead," says Neal Whitney, her supervisor.

She presses a key on her keyboard, starting the much-anticipated process of awarding some of the most coveted hunting licenses in North America, and..."Please Wait" appears on her screen.

It's not the marching band moment I'd been expecting.

"There's such a huge volume of numbers and data to process that it takes a while," explains Ogle, a 15-year veteran of FWP's License Bureau.

Just then a phone starts ringing down the hall. Then another. Hunters across Montana and the United States are calling to see if they've been drawn. Ogle looks at the "Please Wait" notification on her screen and sighs.

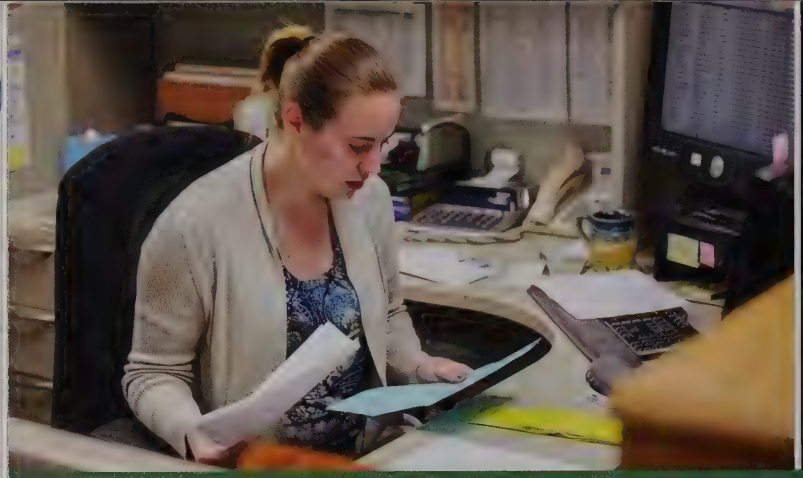
It's going to be a long morning.

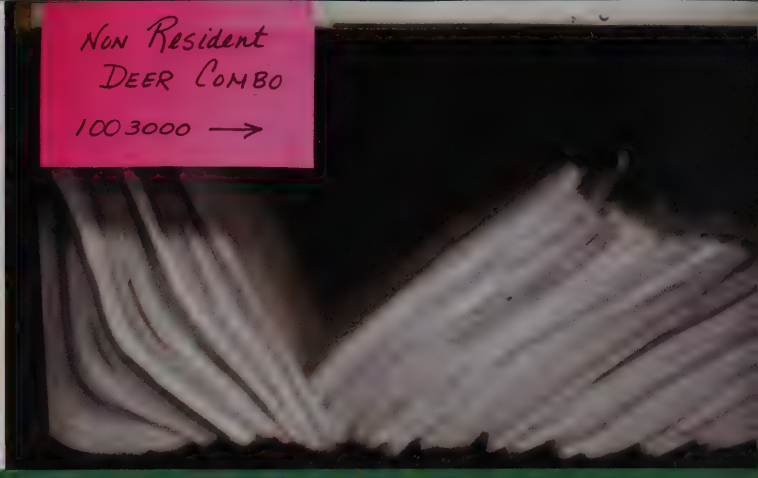
Months of phone calls

The nine people working in FWP's License Bureau issue roughly 1.3 million resident and nonresident hunting and fishing licenses each year and collect the revenue from those sales. A huge part of that job, says Whitney, is monitoring about 300 license providers at gas stations, sporting goods stores, and FWP offices across Montana.

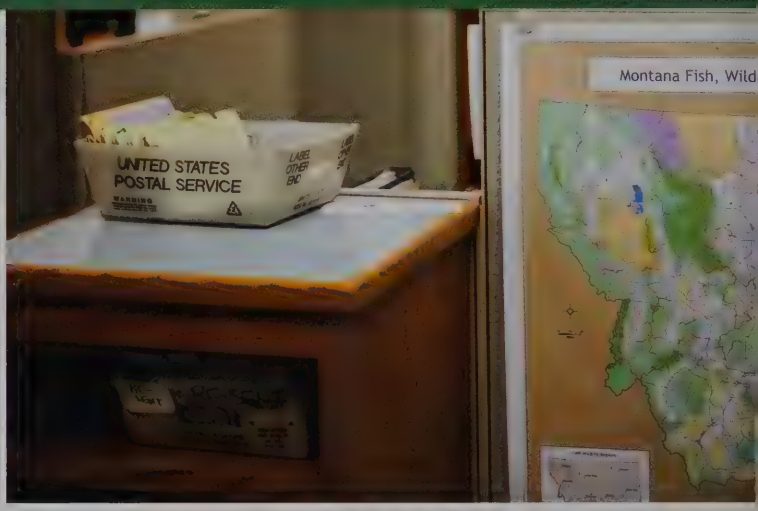
Most deer and elk licenses are readily available at those outlets to hunters. But demand for some licenses far exceeds supply, requiring FWP to conduct lotteries. A few weeks after today's drawing, the department will hold two additional lotteries for special deer, elk, and pronghorn licenses, then another for paddlefish tags.

The main work on lotteries comes before





"We want everyone who enters to get put in the drawing. We hate having to reject applications."



PAPER TRAIL Ensuring accuracy and fairness is essential in maintaining the lottery system's credibility. Top left: Checking paper applications and entering information into the computer. Top right: Paper license applications, partially processed, are sorted by species. Above left: Nonresident applications stored for future review. Above right: The saddest container in the License Bureau is a box of licenses returned by the U.S. Postal Service because of incorrect addresses. Too often, say licensing officials, hunters don't notify FWP of their change of address. Facing page: Hank Worsech, previously a U.S. Marine Corps administrator, has for the past 15 years been chief of the Licensing Bureau. "Hunters need to have faith that [the FWP lottery system] is fair," he says.

the drawings, as crews process roughly 250,000 applications. During the busiest weeks, up to 15 temporary workers fill rows of cubicles, sorting through laundry basket–size bins stuffed with applications. They squint at sometimes illegible handwriting, trying to figure out if that's an "8" or a "5."

For decades, all hunters used paper applications, and all license data was entered by hand. Some of that still takes place. But since FWP instituted its Automated Licensing System (ALS) in 2002, growing numbers of hunters apply online, either from home (65 percent) or at FWP offices (10 percent). Whitney says that many of the remaining 25 percent still using paper forms don't trust the online option, fearing they'll make a mistake with the computer. They ought to reconsider.

"Applying online greatly reduces errors, because it forces you to completely fill out the form before you can enter it," Whitney says. Many hunters err on their paper applications. To emphasize the point, Whitney grabs a random mountain lion license application from a nearby pile and, sure enough, the hunter forgot to fill in the full five-digit hunting district number and must be rejected. "If he'd done this online, the computer wouldn't have accepted it until he filled in all five digits," Whitney says.

Can't someone just call the hunters, explain their errors, and invite them to reapply? "Unfortunately, with so many applications to process, we don't have anywhere near the staff to do that," Whitney explains.

Eventually, hunters will likely stop using paper applications altogether. "There are too many errors, and it's not a benefit for the hunter," Whitney says. "We want everyone who enters to get put in the drawing. We hate having to reject applications."

As phones throughout the basement continue to ring, Whitney tells me the call volume is actually down from earlier in the spring, when hunters were applying for special deer, elk, and pronghorn licenses and moose, bighorn sheep, and mountain goat licenses. "Some days there were just four of us answering 500 to 800 calls from hunters asking for application advice and other information," he says.

The process

The most important part of the lottery system is its trustworthiness, according to Hank Worsech, Licensing Bureau chief.

Tom Dickson is editor of Montana Outdoors.
Nicole Keintz is a photographer in Helena.

"A lot of times they say they want me to 'fix' it, but what they're really saying is 'Fix it for *me*.' But that's not happening. We have to ensure that the process is fair for everyone."

ONE MORE REVIEW Left: Neal Whitney checks bighorn sheep license lottery printouts for statistical errors. Ensuring credibility of the system is essential, he says. Above: Blank bighorn sheep tags await printout with lucky lottery winners' names.

"The odds are that I'll never get drawn. But you never know. One of these years I might get lucky."

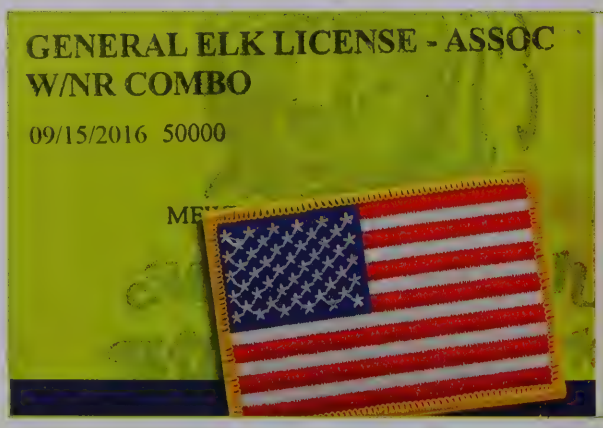
"Hunters need to have faith that it's fair," he says. Before working for FWP, Worsech was an administrator in the U.S. Marine Corps. He likes order and rules and is a stickler for detail. He explains that once someone applies for a lottery license, the application is assigned a random number used in the drawing. That ensures no one receives preferential or unfair treatment. "Some hunters accuse us of 'blacklisting' them if they've broken game laws or publicly disagreed with department policy. That can't happen," Worsech says. "The computer doesn't know the names of who's getting drawn and not drawn. It's all randomized numbers." He adds that the Legislative Auditor's Office audits all FWP lotteries and has found them to be fully random.

From Worsech's office, I stroll down the row of cubicles and eavesdrop on phone conversations between licensing technicians and hunters. One technician explains how to apply for an antelope license. Another tells a parent about youth licensing options. Lorrie Harris, who coordinates the licensing drawings, helps an eastern Montana rancher apply for a landowner preference permit. Everyone is informative, cheerful, and patient. "Most hunters appreciate the time we take to help them get their applications right," Harris says.

Back at his desk, Whitney reviews printouts of drawing results, looking for statistical anomalies. "We do this periodically during the drawing to see if there's a logic problem in the computer program that needs fixing," he says.

By this time, Ogle's computer shows the moose drawing results. The information is loaded into the ALS system so hunters can check results on the FWP website. As he does most years, Whitney applied for moose, mountain goat, and bighorn sheep licenses. He checks the website to see how he did on moose. "Nope," he says. "Same as always."

Worsech walks by and tells us he forgot to apply for any lottery licenses this year. "I completely spaced it out," he says, shaking his head. "And I'm the *bureau chief*."



Donating to disabled vets

The 2013 Montana Legislature passed a law allowing hunters to donate licenses to disabled veterans. FWP works with the Montana Outfitters & Guides Association's Big Hearts Under the Big Sky Program to distribute donated licenses to disabled vets. The department needs additional organizations to help out. "We actually have more donated licenses than we have recipients," says Hank Worsech, FWP License Bureau chief. "Two weeks ago, a husband and wife came in and donated the Elkhorn bull tags they'd drawn. It'd be a shame if we couldn't get those to some wounded vets out there." If your group would like to help, contact Worsech at hworsech@mt.gov.

Supply and demand

FWP licensing staff say the hardest part of their job is talking to disappointed hunters who aren't drawn even after repeated attempts. "We feel their pain," Whitney says. "We're hunters ourselves. Year after year, we put in for these same licenses and don't get drawn."

Unfortunately, far more hunters want licenses than are available. "Believe me, we'd like to issue more licenses," Whitney says. " But we can only issue as many as the game populations can support."

On a state map, Whitney points to a popular mountain goat hunting district northwest of Ennis. Last year 483 hunters applied for the three available licenses. Chances were even worse for a bighorn sheep hunting district north of Thompson Falls, where 390 hunters applied for just one license. "The odds for some of these districts are astronomical," he says.

Ogle continues to bring lottery results for Whitney's final review and approval. At 8:50 a.m., the mountain goat drawing is finished and the results are being posted online. Whitney looks up his own ALS number on the FWP website and sees the all-too-familiar "NOT SUCCESSFUL" notification. "The odds are that I'll never get drawn," he says, taking another stack of printouts from Ogle. "But you never know. One of these years I might get lucky."

By 9:30 a.m., the bighorn sheep license drawing is done. Soon, says Worsech, even more phones will start ringing with calls from hunters unhappy with the results. "The only people we hear from are the unsuccessful hunters," he says. "Hunters who get drawn never call."

Worsech hears from hunters dissatisfied with answers from his staff. "A lot of times they say they want me to 'fix' it, but what they're really saying is 'Fix it for *me*.' But that's not happening. We have to ensure that the process is fair for everyone."

I check in with Whitney one last time. He looks up from his screen. "I didn't draw a sheep license, either," he says. Then, as I head up the stairs, he shouts out to me what tens of thousands of other hunters are thinking at that very moment: "Next year!"

Preventing application rejection

Online applications

Double-check the hunting districts you apply for.

PHOTO COURTESY STEVE C. KLINE

Paper applications

Double-check to be sure the application is completely filled out. "The number one reason we have to reject applications is because someone didn't fill in a blank," Neal Whitney, License Bureau business analyst, says. Be especially sure to fill out all five digits of the hunting districts. Make sure your application check is filled out correctly. Sign the check and the application.

Party hunts

For hunters who want to hunt together and ensure all members are either drawn or not drawn together, the system is set up so that the first person in the party who applies is given a "party number." That person then needs to contact other party members and tell them to use the same number in their applications. "A common mistake is that members don't communicate to each other, so we end up with more than one party number and the applications have to be rejected," says Whitney.

EVEN AKRE

Bonus points still no guarantee

A consistent complaint received by the Licensing Bureau comes from hunters who apply for years without ever receiving a lottery license. "It's common to get a call from a guy whose friend has, say, drawn a bighorn sheep and a mountain goat tag, but he's never drawn either one," says Hank Worsech, bureau chief.

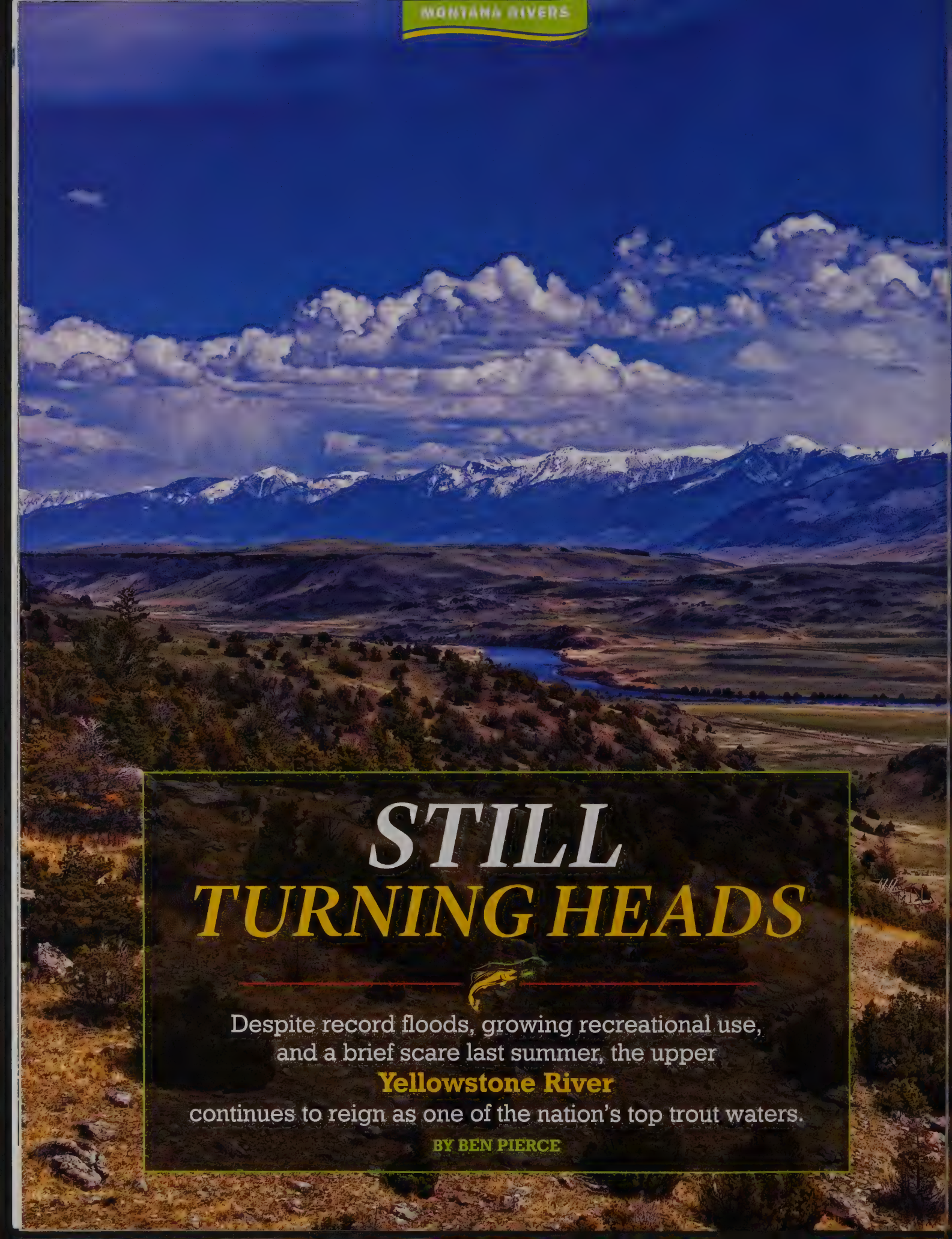
Many hunters want Montana to use a "preference system," in which they would "move up in the line" each year.

Worsech understands the frustration, but a preference system wouldn't work: The only hunters to draw permits would be in their 70s and 80s, he explains. Younger hunters—even those in their 40s and 50s—would have no incentive to apply because they'd never get drawn in their lifetime. "And there'd still be thousands of old hunters who'd never get a tag because there are just so few licenses compared with the number of applicants," he adds.

Instead, Montana uses a system in which hunters can buy and accumulate bonus points. Bonus points, which build up each year that a hunter is unsuccessful, act like extra tickets in a lottery. The more points that hunters accumulate over time, the greater their chances in the drawings. Preference points are squared so that, for instance, three years of points equals nine chances in the lottery. "Our system gives some weight to multiple-year applicants, but because there's still a lot of randomness, it doesn't discourage younger hunters," says Worsech.

Worsech points out that accumulating bonus points over time doesn't necessarily guarantee a license. "Thousands of other hunters are accumulating points, too, so they also get all those extra 'tickets' put in the lottery," he says. "Everyone is competing with each other."

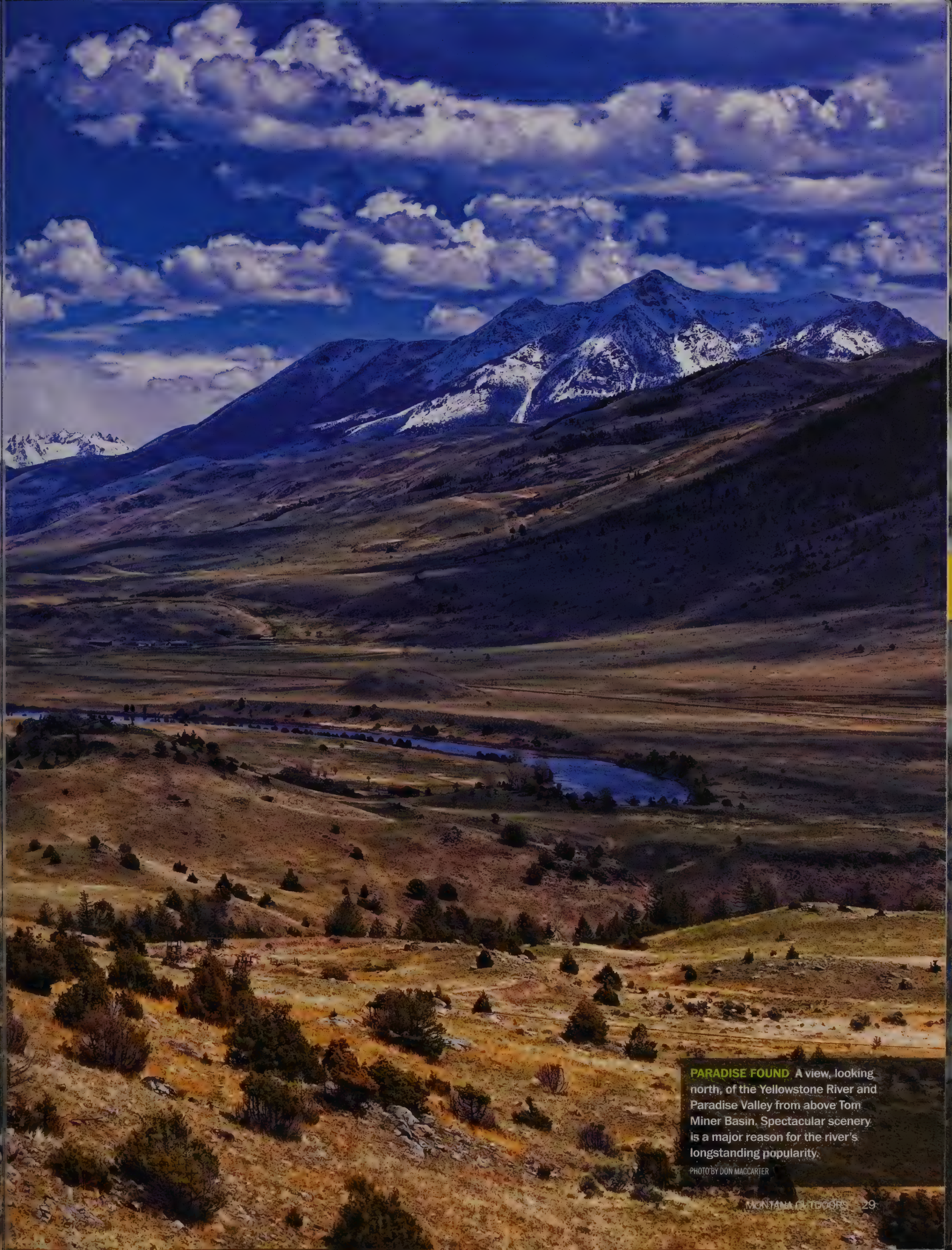
For instance, each year approximately 28,000 hunters apply for Montana's roughly 120 bighorn sheep permits. "So even if you applied for 30 years and built up bonus points all that time, it would still take some luck to get drawn," Worsech says.



STILL TURNING HEADS

Despite record floods, growing recreational use, and a brief scare last summer, the upper **Yellowstone River** continues to reign as one of the nation's top trout waters.

BY BEN PIERCE



PARADISE FOUND A view, looking north, of the Yellowstone River and Paradise Valley from above Tom Miner Basin. Spectacular scenery is a major reason for the river's longstanding popularity.

PHOTO BY DON MACCARTER

BIG NET COUNTRY The Yellowstone's deep pools and abundant insects and sculpins produce larger-than-average trout. But connecting with trophy rainbows, browns, or Yellowstone cutthroat takes skill and experience. First-time visitors should consider hiring a guide for a day or two to learn which insects are hatching and what patterns to use.

The upper Yellowstone is one of those rivers every trout angler grows up dreaming about. I first saw it as a kid while flipping through the pages of my dad's sporting magazines. I remember one photograph in particular of an angler wearing a cowboy hat, casting a fly rod in the golden late-afternoon light. Behind him, snowcapped peaks rose in the distance. It was almost too beautiful to believe.

Growing up, I became smitten with the lore of the Yellowstone River, widely considered one of the world's finest trout fisheries. I learned that this longest undammed river in the Lower 48 was made famous by legendary fly-fishermen like Dan Bailey, Joe Brooks, and Charles Brooks for its superior water quality, prolific hatches, large and abundant trout, and breathtaking scenery. I read again and again that it was on every serious trout angler's bucket list.

When I moved to Bozeman for college in 1994, the Yellowstone was just a half hour away. Not infrequently, I'd cut class to fish that legendary water, which more than lived up to my grandiose expectations. Big fish. Great dry-fly action. And vistas straight out of a tourism advertisement.

But over the years I drifted away from the Yellowstone. There's just so much other prime water to fish in Montana. Its fame notwithstanding, the Yellowstone had become lost in the crowd.

A YELLOWSTONE INSTITUTION
In 1938, Dan Bailey opened a fly shop in Livingston, a stone's throw from the Yellowstone River, offering guiding services and hand-tied flies. By 1981 the shop was the leading fly manufacturer in the United States.

Then, late last summer, Montana Fish, Wildlife & Parks was forced to close the upper Yellowstone for a few weeks (see sidebar, page 36). That was like having cold river water splashed in my face. I decided to take another look at the Yellowstone. How was the river holding up amid increased angling pressure, record flooding, and habitat degradation? Was it still living up to its reputation? In 1966, Joe Brooks wrote in *The Complete Guide to Fishing Across North America* that "the Yellowstone offers probably the best trout fishing in America today." Does that claim still hold up 50 years later?

The Canyon Stretch

The Yellowstone River rises in the Absaroka Mountains of northwestern Wyoming, then flows northward through Yellowstone National Park, entering then exiting Yellowstone Lake. This area of the park has a high density of grizzly bears, which feed on trout congregating in the Yellowstone and other lake tributaries during spring spawning season. Flowing northwest from the lake, the river tumbles over Lower Falls and through the famous Grand Canyon of the Yellowstone before entering Montana at the gateway town of Gardiner near the Roosevelt Arch.

During early summer, the river below Gardiner is popular with whitewater rafters, and rightly so. This part of the upper Yellowstone is a downright ripper during spring runoff and well into July. A look over the edge of the U.S. Highway 89 bridge that spans the river in Gardiner reveals its character. Precipitous canyon walls descend to willow-lined banks strewn with boulders the size of VW Beetles. The river flattens out a mile or so downstream and stays gentle for a few more miles before entering Yankee Jim Canyon, the wildest whitewater on the river.

The same qualities that make this part of the Yellowstone great for rafting produce excellent fishing in late June and early July. Stonefly hatches, particularly salmonflies and golden stones, benefit from the high-gradient, oxygenated water of the canyon. Big nymphs like Kaufmann's Stoneflies and Girdle Bugs fished along the banks ahead of the hatch will draw strikes. A well-placed cast beneath a willow once the big bugs are out can be equally productive. Looking for Yellowstone cutthroat? Scott Opitz, FWP Yellowstone River biologist in Livingston, says this stretch holds the greatest abundance of those native fish.

Because of the whitewater, relatively few anglers fish this stretch. Yet by putting in at Queen of the Waters or Brogan's Landing Fishing Access Sites and taking out at Slip-and-Slide, you can cover great fishing water

and stay clear of the rough stuff. Halfway down on river left, look for Devil's Slide, an unusual 125-foot-tall rock formation consisting of vertical walls separated by a long seam of red, iron-impregnated rock.

Below Slip-and-Slide, Yankee Jim Canyon is for expert boaters only. Named for James George of Vermont (hence "Yankee"), who helped build the first road from Bozeman to Mammoth Hot Springs in the 1870s, Yankee Jim Canyon has claimed the lives of several anglers over the years. Only experienced oarsmen should attempt this stetch. If you have the skill, it's worth floating to reach areas few other anglers fish. "Yankee Jim Canyon weeds out the average Joe floaters and anglers," Bozeman outfitter Hank Welles says. "Even though you are right off the road, you feel like you are miles away from everything."

Though possible, it's tough to wade the Gardiner-to-Emigrant stretch. The river is swift and strong, banks are hard to traverse, and casting is difficult. Farther downstream, however, wade fishing is easier. Anglers generally fish for a mile or two up- or downstream from any of the 12 access sites between Yankee Jim Canyon and Livingston.

Ben Pierce is an editor-at-large for the Bozeman Daily Chronicle.

"They fought like small tigers, and I lost three flies before I could understand their method of escape. Ye gods! That was fishing."

In 1890, British author Rudyard Kipling stopped to fish the Yellowstone River during a train trip up the Paradise Valley. Of the Yellowstone cutthroat trout he caught in this stretch, Kipling wrote, "They fought like small tigers, and I lost three flies before I could understand their method of escape. Ye gods! That was fishing."

Numbers of genetically pure cutthroat on the Yellowstone have declined by 75 percent or more since Kipling's visit. The native trout have been hybridized by non-native rainbows and displaced by aggressive browns. Adding to the decline: habitat degradation from irrigation, streamside grazing, road building, and other human activities.

FWP has made strides to restore at least some of the native population. In the early 2000s, biologists worked with landowners to improve habitat on Emigrant Spring Creek, Big Creek, North Fork Fridley Creek, and other spawning tributaries of the Yellowstone. In some cases, the department bought water leases from landowners to keep water in streams that were previously drained for irrigation.

Scenic stretch

Below Yankee Jim Canyon, the upper Yellowstone turns north at the foot of Tom Miner Basin and breaks out into the broad Paradise Valley. Though the valley is increasingly dotted with new ranchettes and summer homes, the river itself has lost none of its aesthetic charm. Bisecting the Absaroka Range to the east and the Gallatin Range to the west, the Yellowstone here has been immortalized on the covers of countless fly-fishing magazines. Point of Rocks Fishing Access Site offers a launch point for day floats to Emigrant.

This is some of the prettiest water in all of Montana. Add to that cutthroat, brown, and rainbow trout up to and occasionally exceeding 18 inches, and it's no wonder this is

CLOCKWISE FROM BOTTOM LEFT: HANK WELLES; DEBORAH BIEHL - HANK WELLES; HANK WELLES

the most popular stretch on the river.

Other attractions include great hatches of *Baetis* mayflies, March Browns, and Mother's Day caddis, plenty of boat-launching sites, and large trout willing to attack streamers. "When those big fish move up out of their holes along the bank, they are looking for baitfish and crayfish," Welles says. "There are some 10-pounders in there."

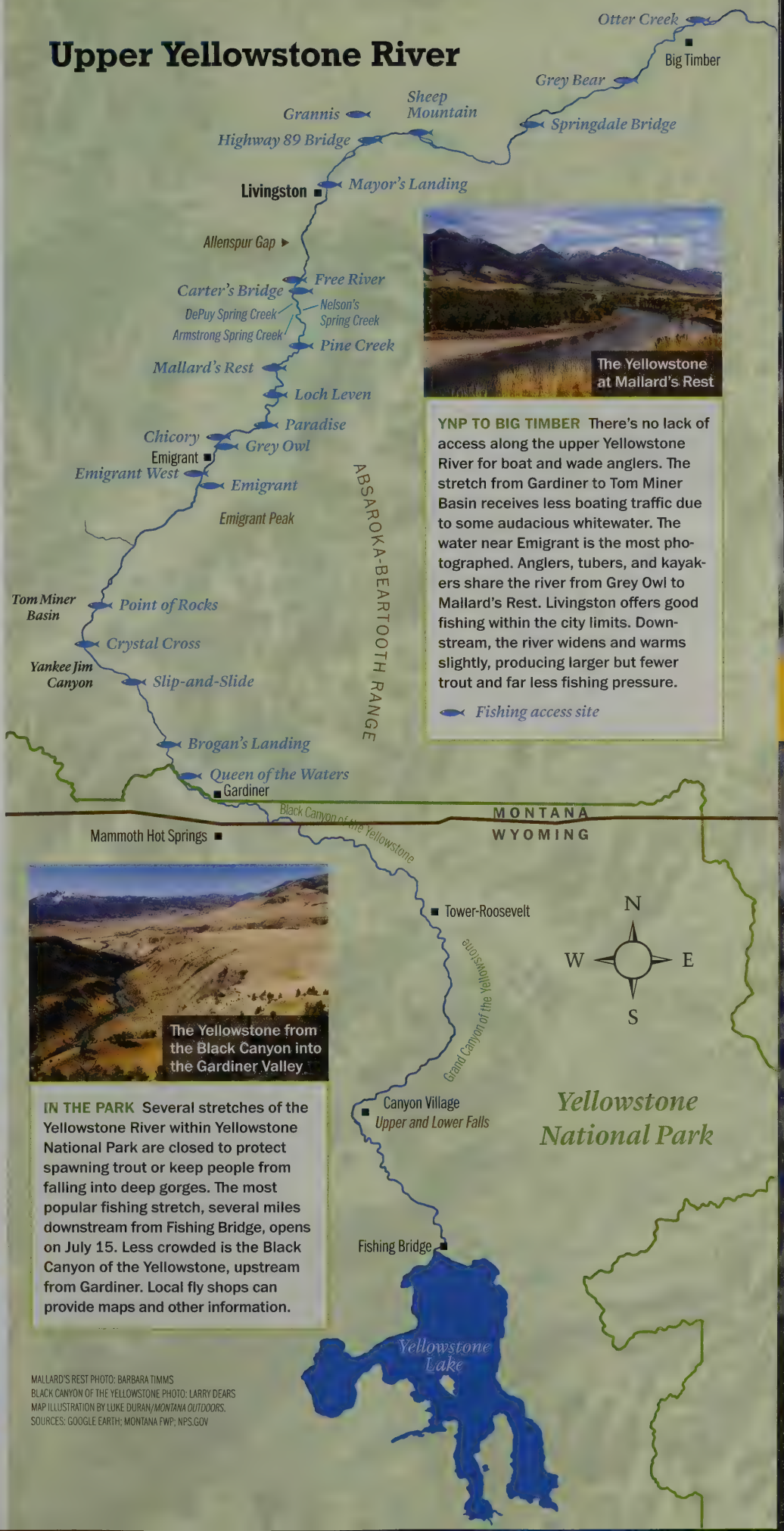
This scenic stretch attracts more than anglers. The 11-mile "bird float" from Grey Owl to Mallard's Rest has become increasingly popular with kayakers and tubers in the summer. "Crowding and inability to park at fishing accesses have changed the experience for many longtime anglers," Opitz says.

The river itself has changed, too. Back-to-back "100-year" floods on the Yellowstone in 1996 and 1997 created new channels and islands, filled longtime pools and scoured out new ones, and created new spawning riffles that increased rainbow numbers a few years later.

The floods also temporarily created public access to a privately owned tributary, Armstrong Spring Creek. Armstrong and two other popular pay-to-fish streams, DePuy (nearby) and Nelson's Spring Creeks (across the river), are rarities in Montana,

LEGENDARY WATERS Clockwise from far left: Negotiating the deep gorge of Yankee Jim Canyon; finding the right salesman to seal the deal; fishing the Yellowstone's famous Mother's Day hatch in a blizzard of caddis; a native Yellowstone cutthroat trout ready for release.

Upper Yellowstone River



The Yellowstone at Mallard's Rest

YNP TO BIG TIMBER There's no lack of access along the upper Yellowstone River for boat and wade anglers. The stretch from Gardiner to Tom Miner Basin receives less boating traffic due to some audacious whitewater. The water near Emigrant is the most photographed. Anglers, tubers, and kayakers share the river from Grey Owl to Mallard's Rest. Livingston offers good fishing within the city limits. Downstream, the river widens and warms slightly, producing larger but fewer trout and far less fishing pressure.

Fishing access site

The Yellowstone from the Black Canyon into the Gardiner Valley

IN THE PARK Several stretches of the Yellowstone River within Yellowstone National Park are closed to protect spawning trout or keep people from falling into deep gorges. The most popular fishing stretch, several miles downstream from Fishing Bridge, opens on July 15. Less crowded is the Black Canyon of the Yellowstone, upstream from Gardiner. Local fly shops can provide maps and other information.

MALLARD'S REST PHOTO: BARBARA TIMMS
BLACK CANYON OF THE YELLOWSTONE PHOTO: LARRY DEARS
MAP ILLUSTRATION BY LUKE DURAN/*MONTANA OUTDOORS*.
SOURCES: GOOGLE EARTH; MONTANA FWP; NPS.GOV

NATIONAL EXPOSURE
The December 1978 issue of *Life* included a 10-page photo essay on the Yellowstone River. Nationwide, public sentiment weighed heavily against impounding the river. Wrote *Life*'s editors: "Paradise Valley could well become a 30-mile-long storage tank for water users far down the river." Soon after publication, a state board ruled against dam proposals.

Why the Paradise Valley isn't underwater

By Nick Bergmann

If not for the golden age of Montana conservation, there likely would be no upper Yellowstone River for fisheries biologists to manage.

As post–World War II urban economic growth fueled increasing energy consumption, coal-generated electricity gained regional and national importance. Despite substantial industrial coal development across the Colorado Plateau during the 1950s and '60s, such activity in southeastern Montana, northeastern Wyoming, and the western Dakotas remained quiet. Rumblings of change began when the Montana Power Company proposed building two power plants in the small mining town of Colstrip.

What especially alarmed many Montanans was the U.S. Department of the Interior's grandiose plan in the early 1970s to turn the Northern Plains into a "national sacrifice area." Containing 42 coal-fired power plants that would produce the energy equivalent of 30 Grand Coulee Dams, the federal plan outlined a dizzying network of transmission lines and water projects. On the Yellowstone, the plan called for a series of dams, reservoirs, and aqueducts to divert 30 percent of the river's annual flow. This included a proposed 380-foot-high dam at Allenspur Gap—a few miles south of Livingston (see map, page 33)—that would flood 20,000 acres along a 30-mile stretch of the Paradise Valley.

Opposition to rapid development of Montana's coal at the expense of the state's agricultural heritage and environmental integrity proved fierce. Local ranchers in the Bull Mountains banded together and formed the Northern Plains Resource Council. Residents of Park County mobilized to fight the Paradise Valley impoundment by forming the Allenspur Committee to Save the Upper Yellowstone. Grassroots activism remained important throughout the struggle. Yet one of the most potent forces advocating Yellowstone River protection emerged from the Montana Department of Fish and Game, as the agency was then called. Empowered by a flurry of progressive legislation and a new, environmentally conscious state constitution, Jim Posewitz led the charge.

As head of the agency's Environment and Information Division during the 1970s, Posewitz coordinated a sustained effort to secure instream river flows for the benefit of fish, wildlife, and recreation. He found himself in an extraordinary position of managing teams of scientists gathering critical information about the river's biological systems and publicizing the agency's conservation ethic through its media resources. Specifically, he oversaw production of an eloquent 32-minute film titled *The Yellowstone Concerto* and release of an influential special issue of *Montana Outdoors* dedicated to conserving the Yellowstone. Posewitz, working with a public relations firm, invited writers and photographers from across the United States on a scenic float down the Yellowstone River. Results of the public relations endeavor included a 10-page color photo essay of the trip published in *Life* magazine.

While the media blitz helped build public support, the department's scientific studies became indispensable to the Yellowstone's future during an intensive two-month public hearing in the summer of 1977. After years of inaction, the Montana Board of Natural Resources and Conservation finally issued a decision in December 1978 prioritizing the protection of the Yellowstone River Basin's economy and environment. Fish and Game and its conservation allies had prevailed in preventing a major hydroelectric dam on the upper Yellowstone River.

As the upper Yellowstone faces new and different challenges, ranging from increasing residential development to warming temperatures, it is worth revisiting the river's history. Digitized copies of *The Yellowstone Concerto*, the *Montana Outdoors* special Yellowstone issue, and a collection of scientific reports known as the Yellowstone Impact Study are publicly available at http://www.arlis.org/docs/vol1/Susitna/41/APA4147.html ■

Nick Bergmann is a PhD student at Montana State University working on a conservation history of the Yellowstone River. Share your knowledge about the river's history or personal experiences related to the 1970s with him at Bergs456@gmail.com

LEFT TO RIGHT: LUKE DIRAN/MONTANA OUTDOORS; ROWAN NYMAN

known for its free public fishing access. The floods redirected the Yellowstone channel so that anglers could wade into the trout-rich Armstrong Spring Creek and avoid paying fees. "The ultimate decision was to engineer the river back to its original channel to protect Armstrong's important function as an essential spawning tributary," says Opitz. The restoration was controversial, but most anglers eventually agreed it was in the best interest of the Yellowstone trout fishery.

Another result of the record floods was more riprap. Many riverside homes were flooded and several washed away during the high water. Afterward, property owners trucked in tons of boulders to raise and fortify banks to prevent future loss. Unfortunately, that "corseted" the river and will push future flooding downstream. "When a river runs high, some of that water needs to spill out into the floodplain," says Travis Horton, FWP regional fisheries manager in Bozeman. Spillover dissipates the river's energy, not to mention revitalizing cottonwood stands and washing nutrients into the river. "When riprapped banks prevent flooding in one stretch, the river water just continues on downstream, gathering force, and gushes out into someone else's property," he says.

Along I-90

Once the Yellowstone hits Livingston, the valley broadens further, the Crazy Mountains rising far to the north. There's some good wade fishing right in town, but it's a bit tricky to find. Ask at any of the four area fly shops for directions.

Downstream from Livingston, the Yellowstone winds east to Big Timber. It's a quieter stretch of water with fewer anglers and recreational floaters. Like the upstream water, fishing picks up when the river clears after runoff in late June and early July. Here, big browns and rainbows lurk off cottonwood-lined islands or in numerous side channels. This stretch has fewer fish per mile, but you'll have those trout pretty much to yourself. "Angling pressure decreases substantially downstream from Livingston," Jason Rhoten, FWP fisheries biologist in Billings, says. One way to take larger trout is by slowly stripping a big streamer in mid-river. Otherwise, fish a nymph, San Juan Worm, or caddis pupa or larva in riffles, pools, and seams near islands.

Mayor's Landing in Livingston to the Highway 89 Bridge at the mouth of the Shields River is a popular float. Sheep Mountain, Springdale Bridge, and Grey Bear Fishing Access Sites offer put-in and take-out options upstream of Big Timber.

Hatches not to miss

Though anglers catch some early season fish in March and even late February with *Baetis*, March Brown, and midge patterns, the first real bug blizzard is the Mother's Day caddis (Grannom) hatch. The best fishing is downstream from Livingston, though caddis patterns take trout all the way upstream to Gardiner this time of year. Caddis typically emerge during the first week of May when the water temperature reaches 50 degrees. During the hatch, parts of the river can be

PICTURE YOURSELF HERE For decades, shots like this, of an angler fishing the Yellowstone amid some of the world's most spectacular scenery, have quickened the pulse of anglers nationwide. Many make a pilgrimage to these hallowed waters at least once in their lifetime.

covered with a writhing blanket of insects, Welles says. "Sometimes you can't breathe from the clouds of caddis around your mouth and nostrils. There are so many caddis, I start to wonder why I am even throwing mine out there."

Though the Mother's Day caddis hatch can be staggering, it is often fleeting. The hatch generally arrives at the same time as spring runoff. Incredible fishing one day can be scuttled by muddy flows the next.

As water levels start to drop after runoff, salmonflies and golden stoneflies start to hatch, especially in the boulder-strewn water upstream from Emigrant. Once water levels stabilize, Green Drakes, Yellow Sallies, and PMD patterns will take fish. Then it's hopper time.

During late summer, grasshopper fishing below Livingston can be legendary. The incessant wind, which occasionally shuts down a day of dry-fly angling on the Yellowstone, becomes downright helpful in August. Gusts push airborne grasshoppers out of hay fields along the river and onto the water, frequently drawing aggressive strikes. To mimic those hapless live hoppers, throw a big Stimulator or Moorish Hopper. Also bring along a few flying-ant patterns. While unpredictable at best, the flying-ant hatch on the Yellowstone can be memorable if you're fortunate to float through on the right day.

> "There are so many caddis, I start to wonder why I am even throwing mine out there."

Welles considers the Yellowstone's unpredictable nature part of its appeal. "It's a moody river," he says. "Temperatures fluctuate. Flows fluctuate. It's at the whim of Mother Nature. Even when I'm on it 20 days in a row, I don't expect the next day to be like the day before. That's what makes it so cool."

The same fickle nature that entertains guides can frustrate a first-time visitor. But any angler—new or experienced—can count on the river's healthy trout population, larger-than-average fish, and screen-saver scenery. I'm not sure the Yellowstone "offers probably the best trout fishing in America." Then again, what river could make that claim? Is it based on trout numbers per mile? Average fish size? Insect abundance? Catch rates? Scenery?

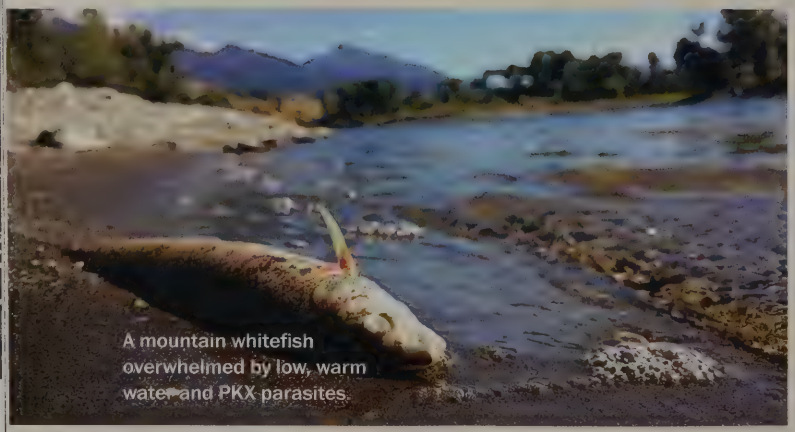
I'll let someone else decide whether the Yellowstone is *the* best. But as an angler who has fished many great trout rivers in Montana and elsewhere over the past 20 years, I can say that it's still, without question, among the best.

Want to follow the Yellowstone River downstream? Check out our portrait of the lower Yellowstone ("Yellow Light on the Yellowstone," May-June 2013). Visit fwp.mt.gov/mtoutdoors/ and search for "Yellowstone."

A grim new reality

Last August, thousands of mountain whitefish and small numbers of rainbow trout washed up on the banks of the Yellowstone River. After alarmed river users reported the fish kill, FWP took the unprecedented step of closing a 183-mile stretch of the Yellowstone—from Gardiner to Big Timber—to all recreational use.

Scientists determined that numbers of a microscopic parasite, *Tetracapsuloides bryosalmonae*, hosted by the river's population of Bryozoan (a freshwater sponge), had become epidemic. The whitefish, already stressed by warm water, died of shock as they were overwhelmed by the parasites, which also infected some with Proliferative Kidney Disease. FWP estimates that tens of thousands of mountain whitefish died during the brief outbreak.



A mountain whitefish overwhelmed by low, warm water and PKX parasites.

The outbreak of parasites, known as PKX, appears to have been triggered by warm, low water in late August. That was caused by sparse snowpack from the previous spring combined with scorching summer heat that raised the river's temperature to 70 degrees—about 15 degrees warmer than is ideal for trout and whitefish.

"Bryozoan populations require warm, slow water to expand their colonies," FWP Yellowstone River fisheries biologist Scott Opitz says. "The whitefish kill was a result of increased exposure to the parasite."

FWP closed the river, even while recognizing that it would cause temporary economic hardship to nearby communities. "The impact goes far beyond the water's edge," Governor Steve Bullock told guides and outfitters at a press conference on the bank of the Yellowstone last August. "We need to make sure we are not only protecting this watershed and this water but indeed our entire state."

A survey by the *Livingston Enterprise* found that 93 percent of respondents supported the decision to close the river.

As water temperatures cooled in September and numbers of dead whitefish declined, FWP reopened the Yellowstone. But the danger has not passed. Since the fish kill, FWP has also discovered the parasite in portions of the Big Hole, Bighorn, Boulder, Jefferson, Gallatin, East Gallatin, Madison, Shields, and Stillwater Rivers. "We don't exactly know what environmental factors led to the fish kill, but, like with whirling disease, it seems related to low water and warmer temperatures," says Opitz. "It doesn't appear that this will be a one-time event. We'll be dealing with this for a long time."

—Ben Pierce

CLOCKWISE FROM LEFT: RYAN WEAVER/FWP; FWP PARTNERS; HANK WELLES; JEREMY BELAN

PRETTY IN PINK The Yellowstone's best fishing is in late summer when the relentless winds blow grasshoppers into the river, triggering aggressive strikes on hopper imitations in various colors (above). Big rivers generally produce bigger-than-average trout, and the Yellowstone is no exception. Though enticing oversized trout to take your fly is never easy, the river provides anglers with some of the best opportunities in Montana to catch large fish (below).

Clearing Things Up

Scientists have a good idea why Clark Canyon Reservoir is sending murky water into one of Montana's premier trout rivers. Now what?

By Paul Driscoll

In the summer of 2014, a 15-mile stretch of the upper Beaverhead River grew mysteriously murky. Nationally known for producing big and abundant brown and rainbow trout, the water in this stretch—from the river's source at the base of Clark Canyon Reservoir to Barretts Siding, about halfway to Dillon—turned grayish green. The turbidity lasted only a few weeks, but returned for longer periods during late summer in 2015 and 2016.

Because trout have a harder time feeding in the murky water, the fish have become skinnier and less desirable to catch. "Lengths are staying the same, but weights are declining," Dillon-based Montana Fish, Wildlife & Parks fisheries biologist Matt Jaeger says.

Trout anglers, accustomed to fat trout and clear water, looked elsewhere to fish. Guided floats on the Beaverhead have declined 75 percent, according to Jaeger. He estimates that the turbidity cost outfitters, cafes, and other tourism-related businesses in Beaverhead County roughly $5 million in 2015. "It's been a major problem," Tim Tollett, owner of Frontier Anglers in Dillon and a longtime Beaverhead guide, says. "We're losing 150 to 200 booked trips per year."

Montana Department of Environmental Quality scientists think they have identified the problem (though underlying causes remain less certain). The question now is what, if anything, state agencies and Beaverhead County outfitters, irrigators, tourism-related businesses, and other stakeholders can do about the problem.

Paul Driscoll is an information officer with the Montana Department of Environmental Quality.

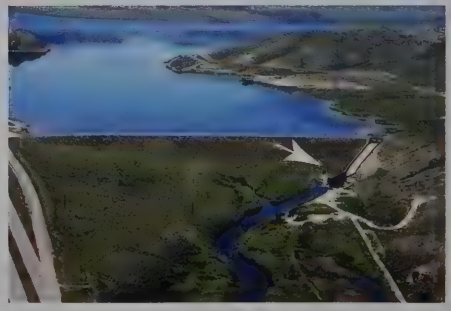
INVESTIGATING THE SITUATION

Clark Canyon Dam is an earthen structure built in the mid-1960s just downstream from the confluence of the Red Rock River and Horse Prairie Creek, which form the Beaverhead River. The reservoir was constructed to provide water for irrigators downstream. It also created a world-class trout fishery along its tailwater below the dam.

Though Clark Canyon Reservoir had previously sent some murky water downstream in the fall, that hadn't ever occurred in summer or lasted more than a few days. Ordinarily, as with most reservoirs, sediment settles to the bottom as the water becomes stratified during summer. As anyone who has swum in a lake knows, warmer, oxygenated water—which is lighter—rises to the top and forms a layer over the heavier, colder water below. Because the water from Clark Canyon is released from the base of the dam, the Beaverhead has traditionally remained cold and clear even in the hottest summer weather.

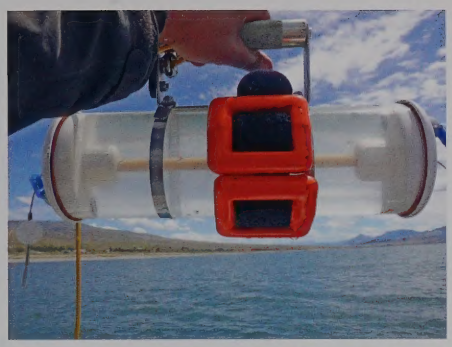
Responding to community concerns over the cloudy water, DEQ and FWP dispatched teams in 2015 and 2016 to monitor and measure turbidity, nutrients, dissolved and suspended solids, dissolved oxygen, and phytoplankton in the reservoir, the Beaverhead and Red Rock Rivers, and Horse Prairie Creek. The Bureau of Reclamation, which owns and operates the dam, studied the reservoir bed level. FWP crews also looked at fish populations.

One theory tested was whether carp and suckers were stirring up sediment as they rooted around for food. But Jaeger says his surveys found so few bottom feeders that fish could not be responsible for the vast amount



WHERE IT ALL BEGINS Clark Canyon Dam forms Clark Canyon Reservoir south of Dillon (above). Where the dam releases water at its base (arrow) is the start of the Beaverhead River, known for its excellent rainbow and brown trout fishing (right).

of sediment mixing. Others theorized that alterations in land use in the surrounding watershed may be sending excess nutrients or pollutants into the reservoir. According to Eric Urban, chief of the DEQ Water Quality Planning Bureau, monitoring and data analysis show that the total amount of nutrients has remained unchanged. The Bureau of Reclamation reports that the reservoir's sediment depth, dam operations, and water releases also have not changed in recent years.



GATHERING OF WATERS A DEQ scientist holds a sampling device used to collect water at various depths on Clark Canyon Reservoir.

WATER LAYERS ARE MIXING

Urban says DEQ scientists have determined that the reservoir is "de-stratifying." In other words, the two ordinarily stable water layers are mixing and somehow stirring up sediment that ordinarily stays on the reservoir bottom. On some days last summer, scientists found a 10- to 20-foot layer of turbid water at the bottom of the reservoir. "The fine sediment delivered to or produced in Clark Canyon Reservoir since its formation is being re-suspended," Urban says.

Fortunately, the degraded water quality seems not to have harmed aquatic life. Jaeger says trout numbers in the Beaverhead remain strong, and DEQ surveys found that the size of aquatic insect communities remains comparable to what surveys found before 2014.

Southwestern Montana snowpack was higher than average in late winter of 2017. If that remains the case into late spring and early summer, water levels on Clark Canyon could increase and water temperatures could stay closer to historical levels. That could lower chances of destratification.

In March, the Beaverhead Watershed Committee formed a team of irrigators, outfitters, and other tourism-related business owners to figure out the best course of action. "I think DEQ has done a great job of diagnosing the problem," Jaeger says. "The challenge now is for agencies and the people most affected by this situation to decide what they want to do about it."

Among options being discussed are keeping the reservoir at a higher water level (a lower pool leads to conditions that favor destratification), and releasing water from higher in the Clark Canyon Reservoir water column. Even if an engineering solution such as changing the water outlet were feasible, says Jaeger, it would be expensive. "If people can identify and agree upon a viable solution, the final challenge to restoring clear water to the Beaverhead will be finding a way to fund it."

Where Sacajawea found her brother

The site of Clark Canyon Reservoir has historical significance dating back more than two centuries. In August 1805, the men of the Corps of Discovery who accompanied Captain William Clark lugged heavily laden canoes upstream on what we know today as the Beaverhead River above Barretts Siding.

Expedition member Patrick Gass noted the Beaverhead's twisty, alder-laden route, still a feature today: *"...the river meanders... through the bushes and is not more than 20 yards wide, and about a foot and a half deep. The water is very cold, and severe and disagreeable to the men, who are frequently obliged to wade and drag the canoes."*

Sergeant John Ordway wrote more cheerily of the river's excellent fishery (composed of westslope cutthroat trout and Arctic grayling): *"...the River crooked Shallow and rapid. Some deep holes where we caught a number of Trout."*

Traveling several days ahead, Captain Meriwether Lewis followed Horse Prairie Creek to the confluence of the Beaverhead. It was near this juncture that he first encountered a Shoshone Indian tribe, the chief of which turned out to be Sacajawea's brother, Cameahwait. The Indian leader assisted the expedition by providing guides and horses. Clark cached his big-river canoes for the return journey in a place that today is inundated by Clark Canyon Reservoir. Because of the fortuitous meeting with Cameahwait, Lewis named the spot Camp Fortunate.

Artist's depiction of Sacajawea reuniting with her brother, Shoshone chief Cameahwait.

CLOCKWISE FROM TOP LEFT: CAROLYN BROWN; MONTANA DEQ; WIKIPEDIA; ART.NET; BEN PIERCE; USBOR

Sadder than a wet hen

by Bruce Auchly

Rain, rain, and more rain. Oh yes, and snow in the mountains. Must be late spring in Montana.

While all that moisture is good for fish, it can be bad news for land-based critters, especially birds.

When it rains, many of us sit inside, grumble, and maybe complain about the corn in the garden not sprouting. But at least we're warm and dry.

Picture a bird on a nest, trying to keep its eggs warm. And those poor fledglings, with their sparse feathers. It doesn't take much cold rain to send them into deadly hypothermia.

Ground-nesting birds, like pheasants on the prairie and juncos in the forest, may have it toughest of all. In a deluge, their nests can end up underwater. Tree-nesting birds, such as robins and orioles, still get wet when it pours, but at least their nests are off the ground.

Every bird species endures problems and dangers during nesting: predators, weather, and pets.

Take our state bird, the western meadowlark, a ground nester that typically lays three to seven eggs. About half of those will survive predation and cold. Then, about two weeks after hatching, fledglings (young birds able to fly) appear.

Even if they reach the fledging stage, many small birds, such as chickadees and yellow warblers, have trouble surviving the first two years of life. Medium-size birds like robins live 4 to 10 years or more, and larger birds such as sandhill cranes and eagles can make it even longer. Because songbirds live short, perilous lives, everything is compressed.

Yellow warblers, which summer here and winter in Mexico, arrive in central Montana to start breeding in mid- to late May. By about June 1, a female will start to lay eggs, one a day for five days. Then she sits on them for about 10 days, until June 15 or so. They all hatch at pretty much the same time. In another 10 days, around June 25, the young birds have fledged.

Think of that in human terms: from conception to teenager in less than a month.

Even during that short time, lots can go wrong, like wet and cold weather that destroys the nest or kills the eggs or young. If that happens, the parents may re-nest, or give up and try again next year, provided they are still alive. It's no picnic being an adult bird, either.

If their first attempt to produce young fails, migratory songbirds re-nest, even if their eggs have hatched.

Prairie game birds, such as Hungarian partridge, sharp-tailed grouse, and pheasants, have different nesting strategies. These ground nesters lay lots of eggs, 10 to 15 per nest, and incubate for about 23 days. All three species often will re-nest if the nest is destroyed, with pheasants the most likely to do so. The game birds usually won't re-nest after the eggs hatch, however. Chicks that die from a wet, cold snap in June or a bad July hailstorm will not be replaced that year.

Another thing about re-nesting: The number of eggs in the second, or even third, nesting attempt will usually be fewer than in the first attempt. And the later in the summer that chicks hatch, the less likely their chance of surviving once the cold weather of fall arrives.

We can gripe about this spring's soggy weather. But compared to all the cold, wet birds out there, we really don't have much to complain about.

Bruce Auchly manages the FWP Regional Information and Education Program in Great Falls. Ed Jenne is a Missoula illustrator.

ILLUSTRATION BY E.R. JENNE

Brook stickleback

Culaea inconstans By Tom Dickson

One of the most intriguing—and frustrating—things about fish is that we so rarely see them. The exception is when anglers haul one up from below the water surface. But because the vast majority of Montana's 85 fish species aren't caught, few of us ever get a chance to view and appreciate these marvelous members of Montana's natural history.

That's certainly the case with the brook stickleback, a tiny native fish found only in northeastern Montana waters. This little oddball—a species actually related to ocean-dwelling seahorses—occasionally shows up in bait buckets, accidentally collected along with minnows and shiners. But for the most part, it remains invisible.

Scientific name

Culaea is a name that scientists created for this unique group of fish, and *inconstans* is Latin for "variable," the meaning of which is unclear.

Identification

The brook stickleback is a medieval-looking fish unlike any other in Montana. It has a large head, large eyes, scaleless sides covered with a row of bony plates, five well-defined spines on its back, and a tiny pelvic fin comprising one spine and one soft ray.

This two- to three-inch-long fish is olive green, with mottled light spots and dark wavy lines along the sides. It has a long, beaklike snout, tiny needlelike teeth, and a protruding lower jaw.

Habitat and Range

As the name suggests, the brook stickleback lives in streams, though it's also found in some rivers, lakes, and ponds. It seems to do best in cool, clear waters with abundant vegetation.

In Montana, it's found mainly in the Milk River and its tributaries as far west as Havre, and in Fort Peck Reservoir and the Missouri River downstream to the North Dakota border. As is the case with several eastern Montana fish, such as the shortnose gar, this is the westernmost range (in the Lower 48) of a species mainly found in the upper Midwest. Like Montana's freshwater drum, another fish closely related to saltwater species, the stickleback likely ended up in the middle of North America after oceans receded and the fish evolved from marine animals trapped in inland waters.

Eat and Eaten

The brook stickleback eats about anything it can get in its tiny mouth. Food includes water fleas, algae, fish larvae, and ants and other small terrestrial insects that fall into streams.

Despite its formidable spiny defense, brook sticklebacks are eaten by many piscivores, including sauger, walleye, yellow perch, crappies, sunfish, bass, and some fish-eating birds such as kingfishers.

Reproduction

No studies of brook stickleback reproduction have been conducted in Montana. Based on research in midwestern states, it's a bizarre affair involving a fair bit of nursery room destruction and repair.

Spawning begins in late spring. The male, which turns a velvety black, builds a nest of algae, sticks, and other plant matter using a sticky secretion formed in his kidneys. With his mouth, he shapes the golf ball–sized structure, which is attached to an aquatic plant stem, and then opens a cavity in the nest.

When a female enters his territory, he rams her a few times with his head then nudges her toward the nest opening. After entering, she vibrates vigorously, releasing eggs, then plunges forward, bursting out the back of the structure. The male enters and releases milt before patching up the hole. Then he guards the eggs. Just before they hatch, he tears apart the nest with his mouth, creating a larger, meshlike area where the tiny fry can hide from predators for a few days before heading out on their own.

Conservation Status

Because so little is known about brook sticklebacks, no one knows how they are faring in Montana. As in other states, the biggest threats to this clean-water species are likely silt and nutrients washing into streams from farm fields.

JOSEPH TOMELLERI

Tom Dickson is editor of Montana Outdoors.

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PARTING SHOT

HITTING THE JACKPOT Each June, FWP holds drawings for coveted licenses to hunt mountain goats, bighorn sheep, and moose. See page 22 for a behind-the-scenes look at the lottery process. Photo by Donald M. Jones.

Montana Fish, Wildlife & Parks

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